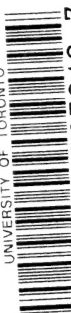


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# TIMBERS OF BRITISH GUIANA

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HERBERT STONE.

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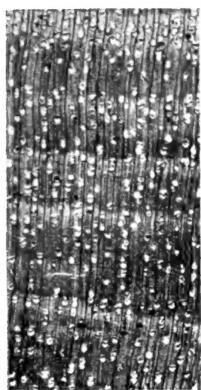
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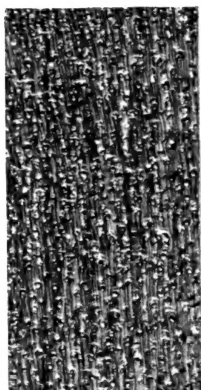
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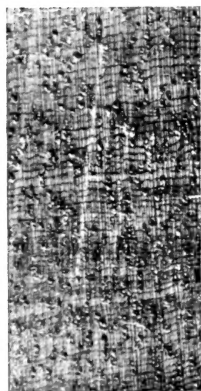
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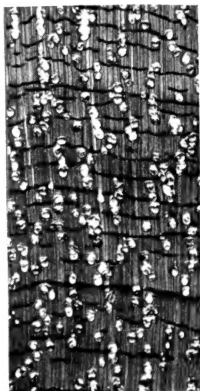
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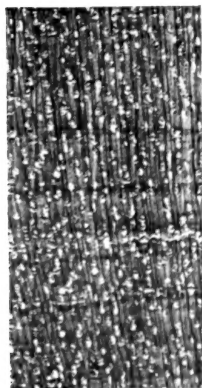
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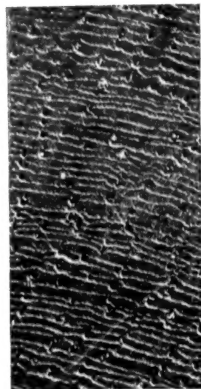
No. 85.—TATABOO.



No. 89.—WAIHAIMA.



No. 91A.—WALLABA.




No. 92.—WAMARA.

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# THE TIMBERS OF BRITISH GUIANA.

A REPORT UPON THE COLLECTION MADE BY  
THE HON. A. G. BELL, M.INST.C.E.



BY

HERBERT STONE,

*(Author of "The Timbers of Commerce and their Identification")*

AND

W. G. FREEMAN, D.Sc.

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## PREFACE.

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THE purposes of the present work are to provide a description of the wood of each species of tree present in the collection made in British Guiana under the superintendence of the Hon. A. G. Bell, M.Inst.C.E., sometime Colonial Civil Engineer; to identify the species as far as possible, and to refer them to their systematic position; to collect any information concerning these species that may already have been published; to record the results of tests made upon the woods by means of tools commonly used in the conversion of timber, and to report upon their commercial utility with especial regard to their prospect of gaining a footing in the English market.

In order to ascertain the systematic names of the different species, a set of the leaves and fruits of each tree were supplied. Special difficulties stood in the way of the addition of a collection of the flowers, hence the comparatively limited success that has been achieved in this important part of the work. It should be borne in mind that, in order to obtain both fruits and flowers, not only must the time of fruiting and flowering be known (which is not often the case), but the knowledge of each species must be sufficiently accurate to enable the collector to be sure that the kind of tree from which he obtains flowers is the same as that from which he subsequently gathers fruits. He cannot mark a tree and pay it another visit at a different season, because the forest is often so dense that a tree must be felled before the crown can be seen. To go on felling trees until one happens upon the right one, to botanise by means of the appearance of the bark and trunk alone, and to fix the right native name upon a tree when found, are too much to expect from a collector. Hence, with much regret, we are compelled to leave many of the species with their native names only, but we hope that the description of the wood is sufficiently copious and minute to enable future workers to fill up the gaps. Botanists having the opportunity of collecting flowers, leaves and specimens of wood *from the same tree*, may, by means of the first, ascertain the systematic name, and, with the help of our descriptions, locate the wood amongst the species in the present series. The authors will gladly welcome assistance from travellers and timber-dealers in the Colony, who may be in a position to fell trees during the flowering period.

The identification of wood by means of the structure is not easy, hence the minuteness of detail into which we have entered. To some this may appear redundant, but when small specimens have to be examined, the most trifling detail is often of great service. On the other hand, the comparison of the structure of two specimens is very easy and convincing. All that is necessary is to trim the end (transverse section) of a plank of each, with a sharp knife or plane, to a cleanly-cut surface, and to hold them side by side in the hand, so that a portion of each may be brought under the lens at the same time. Examination of first one specimen and then another is misleading, and should never be relied upon. Even when thin sections are examined under a microscope they should be arranged so that both are upon one slide and appear in the field of vision at the same time.

Every item in the following descriptions of the woods in this collection, appears in the same order, and may be found readily without reading the whole. The individual features of one wood may be checked against another, word by word. The phrases employed are the same for similar things, and each term bears the same value throughout.

In addition, no feature has been overlooked in any case; if the information be lacking, the fact is indicated by the sign "?".

Wherever the salient features of a wood given by Mr. Bell agree with our specimens, we have adopted his words in preference to our own; but in this, as in every other case, wherever a name or phrase has been borrowed, such loan is ear-marked by a number and indicated by inverted commas. This method, besides rendering credit where it is due, has the advantage of relieving the authors of responsibility for the statements of others, which, in this particular science of lignology, frequently lack precision. As a book of this nature is mainly one of reference, every description has been made complete in itself by appending a list of authorities, with chapter and verse for all quotations, along with a reference to the bibliography at the end of the book.

The testing of the woods to ascertain their working qualities has been carried out either personally or by experienced workmen under our direct control by means of tools such as are commonly found in ordinary workshops, *e.g.*, circular saw, lathe and the various hand tools. The nail test was performed upon  $\frac{3}{4}$ -in. planks by driving 2-in. wire nails into them at a distance of one inch from the end. A wood taking the nail without undue resistance and without splitting is said to "take nails well." The

polishing test is based upon the time and trouble expended in producing a passable finish, as any wood can be made to take a high polish if desired. A soft, spongy wood will absorb coat after coat of polish, and a hard wood, which may leave the cutting-edge of a tool with a natural polish, may yet be very troublesome on account of the amount of filling required by the open pores in order to bring the surface level. Spirit polish often modifies the colour of a wood profoundly; Purpleheart becomes an uninteresting brown colour with this polish.

The superficial comparison of the radial and tangential sections of wood ("quartered" wood and "plankwise") may be very misleading. No two planks can be exactly alike except by accident. In this series the increase in the size of the pores from the pith outwards is very marked, and in some cases the difference is so great that a piece of wood taken from the same block near the bark may be so much coarser in the grain compared with a piece from the neighbourhood of the pith, that they may appear sufficiently dissimilar to seem different species.

The weights per cubic foot have been ascertained by measuring and weighing square, air-dried blocks. In no case has a nearer weight than  $\frac{1}{4}$  lb. per cubic foot been given, as different parts of the same plank will differ as much. The practice of giving the specific gravity of woods to three and four places of decimals is a preposterous proceeding; besides which an average figure is misleading when the variation of the specific gravity in a species is great. The average weight per cubic foot of the Scots Fir or Pine is 36 lbs., but one may meet with specimens as low as 20 lbs., or as high as 52 lbs.

Where the weight per cubic foot has been ascertained from the specimens in this collection only, but one figure can be given. In other cases, where records exist, the highest and lowest are quoted in order to indicate the variation that may be expected. Further records are greatly needed in connection with the less known species.

The colour and other qualities may vary in like manner to the specific gravity, so that different statements by various authors are not necessarily contradictions. The wood of a slowly-grown tree will be heavier, tougher, denser, closer in the grain, darker and richer in colour, than one making wood rapidly; on the contrary, the latter will display the characteristic structure of the species more clearly. When examination with the lens is resorted to, the best-developed zones must be sought for.

Most of the specimens in this collection are from young, quickly-grown trees. This has been an advantage to us in respect to the descriptive work, but we feel that a higher opinion of the quality could have been expressed if the trees had been more mature. Specimens from other sources that we have examined have convinced us that we might have expressed a higher opinion of these woods in almost every instance.

We are indebted to Hon. A. G. Bell for information contained in his report, to the works of John Miers, Michael McTurk, Thomas Laslett and Julius Weisner in particular; also to others enumerated in the bibliography for native names of trees and like details. A small collection of the woods of Dutch Guiana, from Mr. A. H. Berkhout; another of those of British Guiana, from the Rev. J. Aiken; a third received from the Imperial Institute some years ago; Thos. Laslett's collection now in our possession, and Noerdlinger's sections of woods, have been of material assistance, for which we return sincere thanks.

For much kind assistance in the task of identifying the botanical specimens we have to thank the staff of the Botanical Department of the British Museum, especially Messrs. E. G. Baker and J. Spencer Moore. Owing to lack of sufficient material much time and effort led, in several instances, only to negative results.

As it is hoped that the book will be used by those who may be without any knowledge of Vegetable Histology, all scientific terms have been avoided where possible.

Many woods have been labelled with systematic names upon insufficient grounds, and writers have passed them on from one to another until these names have become well-established errors. Wherever we have found it necessary to correct a systematic name, we have used our own judgment in retaining the alternative (native, popular or trade) names, that have become associated with them. For instance, Nos. 73 and 74 are Purplehearts. The former is reputed to be *Copaifera pubiflora* var. *bracteata*, or *C. bracteata*, and under this name mention of commercial Purpleheart is made in many books; whereas No. 74, "Saka," is the Purpleheart of the English market, and turns out to be *Peltogyne paniculata*. Bth. Notwithstanding this alteration, we retain the alternative names where we are satisfied that they belong to the wood Saka, and not to *Copaifera*.

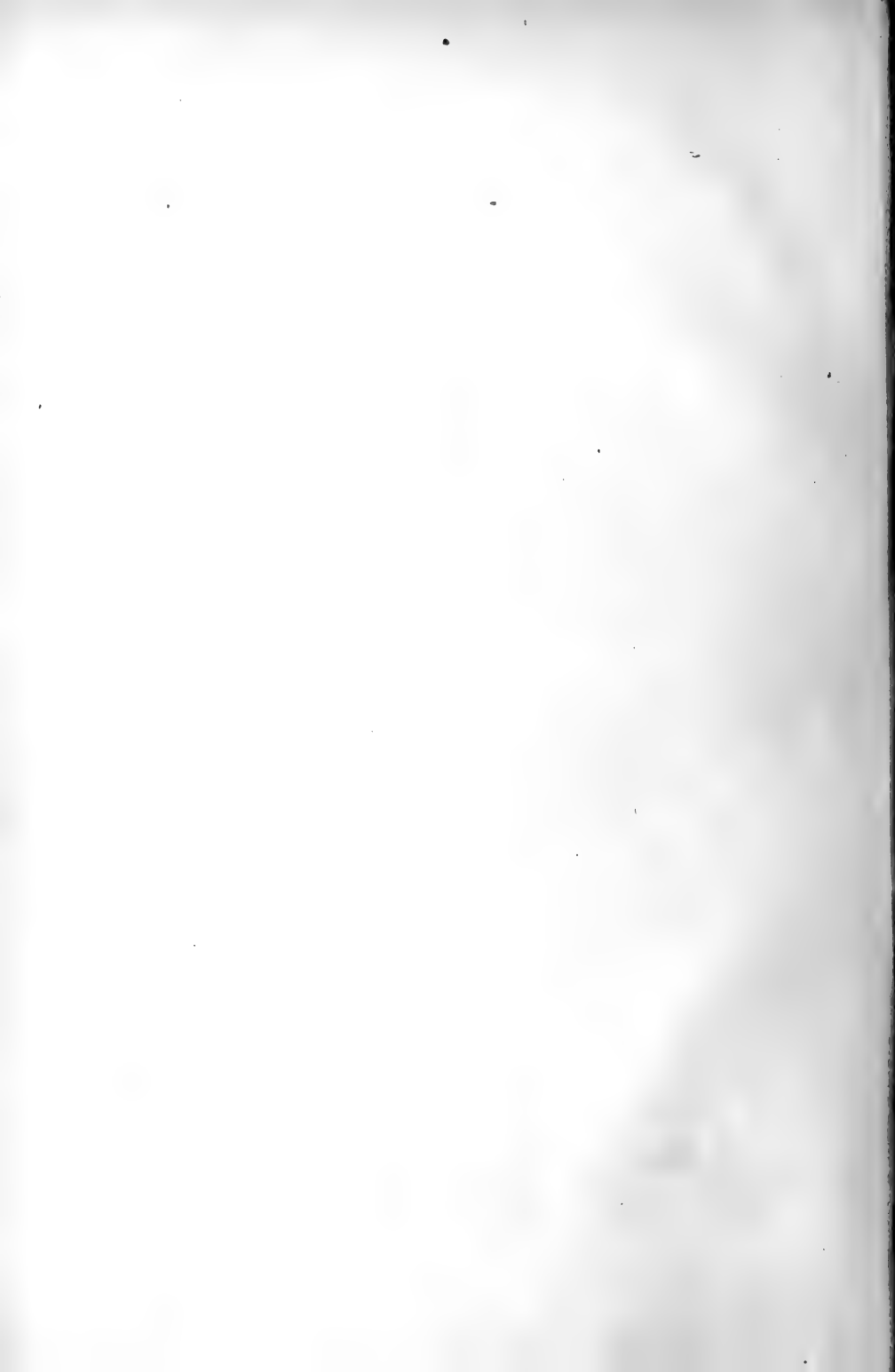
The illustrations being of the nature of an afterthought are not so good a selection as we could have made had we had an illustrated work in view from the beginning. The choice has been difficult

for practical reasons. As the specimens were cut in the forest in the form of short drums, they naturally split in drying, and in most cases arrived full of minute fissures. Specimens preserve their condition better when cut or split into sectors or billets, three or four feet long; and they are also then more easily transported.

The arrangement of the pores (vessels), soft tissue (wood parenchyma), and the appearance of the rays (medullary rays) have often great systematic value, *i.e.*, a family likeness, often obvious, is frequently to be observed. The similarity between species belonging to the Natural Order Leguminosæ will be evident when the examples here described are compared. Equally striking is the resemblance between woods of the Sapotaceæ and of the genus *Lecythis*, which may be recognised at a glance. The same may be said of many other orders and genera which are not sufficiently well represented here to need special mention.

Each species in this collection, even if it be not systematically identified, is described with sufficient accuracy to enable a student to recognise it, hence we hope that this report will afford a basis for the completion of the work.

THE AUTHORS.



# THE TIMBERS OF BRITISH GUIANA.

## A REPORT UPON THE COLLECTION.

### 1.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ. *Native Name*, "ARAMATA" (2).

*Salient Features*.—A greenish-brown wood of medium weight and hardness. It has conspicuous concentric lines in Transverse section.

*Physical Characters*.—Weight (so far recorded),  $50\frac{1}{4}$  lbs. per cubic ft. Hardness, Grade 6, firm; compare Beech. Smell little, if any, except perhaps when being worked. Taste slightly Cedar-like.

*Colour*.—Heartwood darkens considerably on exposure to the air. Sapwood the colour of Oatmeal, well defined from the Heart; width,  $\frac{5}{8}$ - $1\frac{1}{8}$  in. Surface dull, except in Radial section.

*Bark*.—About  $\frac{3}{16}$  in. thick; light brown or yellowish, rather smooth; fibrous within, becoming hard towards the outside, and having a hard, light-coloured (? white) layer immediately beneath the outer skin. Surface of the log beneath the Bark, smooth.

*Uses, Qualities, etc.*—"Readily procurable in lengths up to 30 ft. squaring 10-12 ins." (2). "Boat-building, house-framing and sometimes for cabinet work" (20). Not an ornamental wood. Very hard to saw. Fissile, takes nails badly. Planes very badly and moderately hard. Turns hard and badly. Polishes indifferently. Of little, if any, value for export.

*Authorities*.—2. Bell, p. 3. 12. Hawtayne, p. 386. 17. Laslett, p. 452. 20. McTurk, p. 6.

### ANATOMICAL CHARACTERS.

*Transverse Section*.—Darker in shade than the Radial.

*Pores*.—Readily visible with the naked eye on account of the conspicuous soft tissue accompanying them; large; not diminishing towards the close of the season's growth; little variation except in the groups, where the middle pores are usually very much smaller. Evenly distributed. Single or sub-divided in radial, linear groups of from 2-6 pores. Few, 1-6 per sq. m/m.

*Rays*.—Just visible with the naked eye; very fine; uniform; regular; about the width of a Pore apart; 6-9 per m/m.; avoiding the Pores little, if at all.

*Rings*.—Ill-defined; boundary (?). A Pore-less zone, if any. At a casual glance, the rings appear defined and of regular contour, but the lens fails to verify the impression. Average growth,  $5\frac{1}{2}$  rings per inch of radius in my specimen.

*Soft Tissue*.—Of definite arrangement; type of *Pterocarpus*, i.e., in weak, irregular, light-coloured lines rather thicker than the Rays, enclosing and connecting the Pores concentrically.

*Pith*.—(?)

*Radial Section*.—Lighter in shade than the Transverse. The Pores appear as fine, colourless scratches, and the soft tissue as light-coloured lines, the Rays as minute, lustrous flakes. The rings seem to be indicated by vague, darker, vertical streaks here and there.

*Tangential Section* as the Radial, but the Rays need the lens, being minute white lines about 25 m/m. high.

*Type Specimen*.—Authenticated by Bell, No. 1/2657.

## 2.—ANONA SP.

*Nat. Ord.*, ANONACEÆ. *Native Name*, "ARREWEDA" (2).

*Salient Features*.—A very hard, heavy, fine and close-grained brown wood, suggesting inferior Greenheart.

*Physical Characters*.—Weight (so far recorded),  $69\frac{1}{2}$  lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Smell and taste 0.

*Colour*.—Dark nut-brown, with perhaps a tinge of green. Darkens a little on exposure to the air. Apparently a Sapwood tree. Surface bright.

*Bark*.—About  $\frac{1}{8}$  in. thick and extremely hard, woody\*; dark brown within; smooth outside like that of Sycamore. Surface of log beneath bark, finely striated.

*Uses, Qualities, etc.*—"Squares from 6-9 ins.—axe-handles, floor beams—very durable" (2). Hard to saw. Fissile, takes nails badly. Planes well though hard; turns hard but indifferently. Takes a moderate finish. Of little, if any, value for export.

*Authorities*.—2. Bell, p. 3.

### ANATOMICAL CHARACTERS.

*Transverse Section*.—Darker than the other sections.

*Pores*.—Visible with the naked eye from their light colour. Small, not diminishing towards the close of the season's growth, little variation. Oval, mostly single. Evenly distributed, widely scattered, 1 to 12 per sq. m/m. Mostly filled with a conspicuous white deposit, which makes them visible in contrast with the very dark ground.

*Rays*.—Visible with the lens, very fine; uniform; irregular but about a Pore-width apart; weak but scarcely avoiding the Pores. Red when moist.

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(\* i.e., resembling wood rather than bark—H.S.).



*Rings*.—Ill-defined; boundary a very fine, interrupted, white line of soft tissue; casual and uncertain; contour regular.

*Soft Tissue* of no definite arrangement, merely narrow borders to the Pores, excepting the boundary-line mentioned above. (There are indications of minute, concentric bars.)

*Pith*.—(?)

*Radial Section*.—A little lighter in shade than the Tangential, and much lighter than the Transverse section. The Pores appear as very fine scratches; the rays as minute flakes, just visible by reflection. The rings are not indicated.

*Tangential Section* as the radial, but the Rays need the lens, being minute and almost imperceptible. Height about 1 m/m.

*Type Specimen*.—Authenticated by Bell, No. 2/2658.

### 3.—PTEROCARPUS GUIANENSIS. AUBL.

*Nat. Ord.*, LEGUMINOSÆ.

*Synonym*, VATAIREA GUIANENSIS. AUBL.

*Alternative Names*.—"Arisourou" (2); "Dartrier; Graine à Dartre in French Guiana" (12); "Ourisoura" (24a).

*Salient Features*.—A yellow to rich brownish-red wood, with coarse, open grain, and a bitter taste like that of (cigar box) Cedar.

*Physical Characters*.—Weight (so far recorded),  $46\frac{3}{4}$  lbs. per cubic ft. When seasoned, it floats with rather more than a third of its bulk out of the water. Hardness, Grade 7, soft, compare Birch. Smell when dry, none. Taste like Habana Cedar; "very bitter" (20); "like quinine" (27).

*Colour* of Heartwood; "yellow" (20); dark yellow; rich reddish brown to dull brown, or even green. Darkens a little on exposure to the air. Sapwood, oatmeal-colour;  $1\frac{1}{2}$ -2 ins. wide, sharply defined from the Heartwood. Surface lustrous.

*Bark*.—About  $\frac{3}{16}$  in. thick, smooth or warty; of two layers; the inner  $\frac{1}{16}$  in. thick, fibrous and bast-like; the outer crumbling and full of hard, whitish grains. Outside of log beneath bark, finely striated.

*Uses, Qualities, etc.*—"Readily procurable in lengths of 40-50 ft., squaring 12 ins." (2). "Lasts long when exposed to the weather, and is not eaten by worms" (20). "Brittle" (1). Fissile, takes nails badly. Specimen turns and planes very badly, but I have handled much better qualities with better results. It polishes indifferently. Of little, if any, value for export.

*Authorities*.—1. Aublett. 2. Bell, p. 3. 17. Laslett, p. 252. 20. McTurk, p. 5. 21. Miers. 24a. Rodway. 27a. Stone, p. 264. 12. Hawtayne, p. 385.

#### ANATOMICAL CHARACTERS AS FIG. 92 FRONTISPIECE.

*Transverse Section*.—Darker in shade than the other sections.

*Pores*.—Visible with the naked eye; conspicuous from their colour and size; large, not diminishing towards the close of the season's growth; little variation except in the groups, where it is considerable. Evenly distributed in bold, sinuous, oblique lines.

Few; single; also many sub-divided into groups of 2-6 Pores. The oblique lines are continuous over long radial distances.

*Rays*.—Visible with the lens; very fine; uniform; regular; straight; about the width of a Pore apart, scarcely avoiding them.

*Rings*.—Ill-defined; boundary doubtful, but here and there is a zone poorer in Pores and occasionally a fine line. Contour regular; apparently averaging 5 per inch of radius.

*Soft Tissue* of definite arrangement; type of Ineeriballi No. 41 of this series, i.e., surrounding, imbedding and connecting the Pores as above. (Perhaps also in the occasional boundary-line to the Rings.)

*Pith*.—(?)

*Radial Section*.—Lighter in shade than the other sections and more lustrous. The Pores appear as coarse, shining grooves. The Rays are very small, inconspicuous, whitish flakes. The Rings are not indicated.

*Tangential Section*.—As the Radial but the Rays need the lens being very minute, scarcely perceptible, white lines, and are about 25 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 3/2659. Imperial Institute (from Colonial and Ind. Ex.), No. 0370.

#### 4.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ. *Native Name*, "ASSAKOOLA" (2).

*Salient Features*.—A hard, heavy, close-grained, reddish-brown wood.

*Physical Characters*.—Weight (so far recorded), 59 lbs. per cubic ft. Hardness, Grade 6, firm; compare Teak. Smell and taste 0. Apparently a Sapwood tree. My specimen is from a tree 9 ins. in diameter and has no Heartwood, but this is by no means conclusive. Darkens a little on exposure to the air. Surface bright.

*Bark*.—About in. thick, nearly smooth; of two layers, the laminae of which (in Trans. sec.) run at right angles to each other. Surface of log beneath the Bark, striated deeply.

*Uses, Qualities, etc.*—"Suitable for house-framing—is readily procurable up to 25 ft. in length, squaring 8-9 inches" (2). Very hard to saw. Fissile, takes nails badly; the specimen was shattered into a number of separate pieces by shakes. Planes and turns hard and badly. Polishes badly. Of little, if any, value for export.

*Authorities*.—2. Bell, p. 3. 12. Hawtayne, p. 387. 17. Lasset, p. 452. 20. McTurk.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—Similar in shade to the other sections (approximately).

*Pores*.—Readily visible with the naked eye, conspicuous from their light colour; large; little variation. Mostly single; a few pairs. Evenly distributed. Some contain a white deposit.

*Rays*.—Just visible with the naked eye. Red. Apparently of two kinds, the smaller being of microscopic size; irregularly spaced; undulating, but not avoiding the Pores.

*Rings*.—Not defined; an occasional dense zone; contour regular.

*Soft Tissue* of no definite arrangement; sheathing the Pores.

*Pith*.—(?)

*Radial Section*.—The Pores appear as fine, inconspicuous, shining scratches; the Rays (when moist or polished) as bold, conspicuous, red patches. Rings not indicated.

*Tangential Section* as the Radial, but plainer; the Rays do not need the lens, being prominent when moistened. They are about 3 m/m. high and very coarse-celled.

*Type Specimens*.—Authenticated by Bell No. 4/2669. Imp. Inst. (from the Col. & Ind. Ex.), No. 0370.

## 5.—NOT IDENTIFIED.

*Nat. Ord.*, SAPOTACEÆ.

*Alternative names*, "ASSAPOOKOO" (2). "ASSAPAKA" (12).

*Salient Features*.—A yellowish-brown, very hard, fine-grained compact wood of uniform colour.

*Physical Characters*.—Weight (so far recorded), 64 lbs. per cubic ft. Hardness, Grade 4, hard; compare Hornbeam. Smell when dry 0 (a little when being worked). Taste 0. "Reputed highly poisonous" (1a). Heartwood not defined from Sapwood, apparently a Sapwood tree. The specimen is from a tree but 9 ins. in diameter; do larger trees develop a darker heart? Darkens a little on exposure to the air. Surface bright to lustrous.

*Bark*.—About  $\frac{1}{8}$  in. thick, fibrous, flaking off in thin scales. Surface of log beneath Bark, striated.

*Uses, Qualities, etc.*—"Readily procurable up to 30 ft., squaring 8-9 ins.—house-framing" (2). Very hard to saw. Fissile, takes nails badly. Planes easily and well. Turns hard and indifferently well. Finishes moderately well. A promising wood, but not likely to compete with the cheaper woods of equal quality already on the European market.

*Authorities*.—2. Bell, p. 3. 1a. Bates. 12. Hawtayne, p. 387. 17. Laslett, p. 452.

## ANATOMICAL CHARACTERS.

Similar to those of *Mimusops*, No. 12, and other Sapotaceous woods (27a, Pl. X., fig. 83).

*Tranverse Section*.—Similar in shade to the other sections.

*Pores*.—Visible to the naked eye to good sight; small; not diminishing towards the close of the season's growth; little variation; round. Evenly distributed in short radial groups of 2-4 Pores; not sub-divided.

*Rays*.—Visible to the naked eye to good sight; very fine; uniform; regular; about the width of a Pore apart. Weak, slightly avoiding the Pores; light coloured.

*Rings*.—Ill-defined; boundary doubtful; contour regular.

*Soft Tissue* of definite arrangement; type of *Mimusops*, i.e., sheathing the pores and connecting them into the radial strings, but in the present species not joining up into such long strings as in *Mimusops* (See No. 12, Bullet Tree). Here the S.T. is more usually a mere border to a group of 2-4 Pores.

*Pith*.—(?)

*Radial Section*.—Similar in shade to the other sections, but more lustrous. The Pores are fine scratches, containing shining particles of gum. The Rays are whitish, transparent flakes, visible by means of their lustre.

*Tangential Section* as the Radial, but duller. The Rays need the lens, being minute, whitish lines that are scarcely perceptible; height about .25 m/m.

*Type Specimen*.—Authenticated by Bell, No. 5/2661.

## 6.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ, near *ROBINIA* AND *SWARTZIA*.

*Native name*, "BANIA" (2).

*Salient Features*.—A hard, heavy, deep purple wood.

*Physical Characters*.—Weight (so far recorded), 77 to 84½ lbs. per cubic ft. Sinks in water even when seasoned. Hardness, Grade 2, extremely hard; compare Boxwood, Greenheart. Smell when dry 0. Taste 0. Colour of Heartwood, uniform dark purple. Darkens but little on exposure to the air. Colour of Sapwood, "Oatmeal," sharply defined from the Heartwood; width 1-1½ ins. Surface bright.

*Bark*.—About ⅛ in. thick, brown, soft and corky with shallow cracks; scaling in soft, flat, crumbling scales (the outer layer). Inner layer about half the whole thickness; firm and woody.

*Uses, Qualities, etc.*—"Suitable for walking-sticks, rulers, and small furniture. It is not common. Can be got in lengths up to 30 ft., but the stem, being fluted, in only small sizes" (2). Exceedingly hard to saw; too hard for nails; planes hard and badly; turns hard and indifferently, and takes a mediocre finish. A valuable wood nevertheless for turnery, inlaying and Tunbridge-ware. Sometimes confused with *Wamara* on account of the great similarity of colour, weight, hardness and structure. The resemblance is very marked.

*Authorities*.—2. Bell, p. 3.

## ANATOMICAL CHARACTERS.

Almost identically the same as those of *Wamara*, No. 92, from which it is practically indistinguishable. The only difference that

I have been able to detect is in the soft tissue. This may or may not be constant, so I give it for what it is worth.

*Soft Tissue.*—Transverse section.

The concentric lines are not always continuous, and are sometimes fragmentary, and their width is not much more than that of the Rays. The S.T. is a subordinate feature.

*Type Specimen.*—Authenticated by Bell, No. 6/2662.

## 7.—NOT IDENTIFIED.

*Nat. Ord.*, BURSERACEÆ. *Native Name*, "BARADA-BALLI" (2).

*Salient Features.*—A close-grained brown wood of medium weight and uniform colour.

*Physical Characters.*—Weight (so far recorded), 51 lbs. per cubic ft. Hardness, Grade 6, firm. Smell and taste 0. Colour of Heartwood, "White" (2). My specimen is distinctly brown. Darkens but little on exposure to the air. Sapwood not defined from the Heartwood (?), a Sapwood tree.

*Bark.*— $\frac{1}{8}$ – $\frac{1}{4}$  in. thick, wrinkled; dark brown within; woody, full of hard bodies. Surface of log beneath Bark, finely striated.

*Uses, Qualities, etc.*—"A useful furniture wood and gives good boards" (2). Fissile, takes nails badly. Planes easily but very badly; turns indifferently, though moderately easily. Polishes well. Of little, if any, value for export.

*Authority.*—2. Bell, p. 3.

## ANATOMICAL CHARACTERS.

*Transverse Section.*—A little darker than the other sections.

*Pores.*—Visible with the naked eye when moistened; little variation; evenly distributed; mostly single, some pairs.

*Rays.*—Scarcely visible with the naked eye; very fine; of two kinds, both pigmented. Irregularly spaced, as regards the middles of the larger, much more than the width of a Pore apart. The smaller Rays and the attenuated edges of the larger are less than the width of a Pore apart, and are very numerous.

*Rings.*—Apparently well-defined; boundary doubtful; contour regular.

*Soft Tissue.*—Of no definite arrangement, merely sheathing the Pores.

*Pith.*—(?)

*Radial Section.*—The Pores appear as fine scratches; the Rays as fine lines, visible in certain lights; the Rings are not indicated.

*Tangential Section* as the Radial, but the Rays are still more difficult to see. In a properly prepared microscope section, the Rays are seen to be large and small. The large are spindle-shaped bodies terminated at each end by a single row of cells, about half the height of the many-rowed portion. Unlike the "edge-cells" of

the Rays of most woods, they contain colouring matter. The small Rays are also pigmented and resemble the "edge-cells" of the larger. Height of the larger about 1 m/m.

*Type Specimens*.—Authenticated by Bell, No. 7/2633.

### 8.—LUCUMA MAMMOSA. GAERTN.

*Nat. Ord.*, SAPOTACEÆ.

*Synonyms*, ACHRAS MAMMOSA. LINN; A. LUCUMA. BLANCO.  
not LUCUMA BONPLANDII, as reputed.

*Alternative Names*.—"Barataballi" (2); "Bartaballi" (12); "Mammee Sapote. Marmalade Plum" (16a); "Salie" (10b); "Marmelade naturelle. Leucome" (26); "Mamey colorado. Sapote" (12).

*Salient Features*.—A fine-grained, compact, rather hard, heavy wood of a uniform reddish colour.

*Physical Characters*.—Weight (so far recorded), 56½ lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew. Smell or taste 0.

*Colour*.—"Pale brown" (12); "Red brown" (2). Apparently a Sapwood tree. My specimen, 8 ins. in diameter, is all Sapwood. Darkens slightly on exposure to the air. Surface clean.

*Bark*.—About ½ in. thick; hard and woody, brown within; full of hard, whitish bodies. Surface of the log under the bark, finely striated.

*Uses, Qualities, etc.*—"Plentiful—averages a height of 90 ft.—boards—doors, etc.—furniture, partitions—can be had to square 20 ins. free of Sap" (20). Saws rather easily. Fissile, takes nails badly. Planes and turns moderately easily and well. Polishes indifferently. A wood of good appearance and quality, but scarcely of sufficient merit to compete with similar woods in the European market.

*Authorities*.—2. Bell, p. 3. 3. Berkhout (specimen). 4a. Boulger, p. 426. 12. Hawtayne, pp. 384, 449. 16a. Kew, p. 137. 10. Devenish, p. 423. 20. McTurk, p. 4. 26. Schomburgk.

### ANATOMICAL CHARACTERS.

The same as those of Sibbidanni (No. 78).

*Transverse Section*.—Darker than the other sections.

*Pores*.—Visible to the naked eye; small; not diminishing during season's growth; some variation, but in no particular order. Scattered and evenly distributed, having the appearance of being attached to the Rays.

*Rays*.—Visible to the naked eye; fine; of one kind; regular, more than the width of a Pore apart; not avoiding the Pores.

*Rings*.—Apparently defined; boundary doubtful; contour regular.

*Soft Tissue* of no definite arrangement, sheathing the Pores only.

*Pith.*—(?)

*Radial Section.*—The Pores appear as fine grooves and occasionally contain clear red beads. The Rays appear as small flakes that are prominent when moist or polished. The Rings are not indicated.

*Tangential Section* similar to the Radial, but the Rays do not need the lens, being readily visible when moist; about 1 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 8/2664; Berkhout, No. 2634.

### 9.—ORMOSIA COCCINEA. JACKS.

*Nat. Ord.*, LEGUMINOSÆ.

*Synonyms*, ROBINIA COCCINEA. AUBL.

*Alternative Names.*—"Barrakarra" (2); "Petit Panacoco de Cayenne; Petit Panacoco, in French Guiana" (1); "Apoetoe" (?)

*Salient Features.*—A light-reddish wood, lined and flecked with white. Of medium weight and lustrous surface.

*Physical Characters.*—Weight (so far recorded), 44½ lbs. per cubic ft.; floats high in the water when seasoned. Hardness, Grade 3, very hard. Smell or taste 0.

*Colour* of Heartwood light red, with a milky appearance caused by the abundant soft tissue (see this). Darkens a little on exposure to the air. Colour of the Sapwood, reddish-white, well defined from the Heartwood; width about 1½ ins. Surface lustrous; not cold to the touch.

*Bark.*—About ¼ in. thick, rather smooth (indented and rather warty); hard and woody within, crumbling externally. Outside of the log below bark, striated.

*Uses, Qualities, etc.*—"Scantlings, railway-sleepers and wood-paving, readily procurable in logs up to 60 ft. in length to square 16-18 ins." (2). "A valuable wood" (38). Saws easily. Fissile, takes nails badly. Planes badly and moderately hard. Turns moderately hard and indifferently. Polishes passably. The specimen was worm-eaten and had apparently been attacked by ants. A handsome wood which might compete with inferior qualities of Mahogany. Sometimes confused with Bourracourra, No. 60, on account of the similarity of the name, also with Barracarra (*Erythrina corallodendron*) of Brazil (7).

*Authorities.*—1. Aublett, p. 773. 2. Bell, p. 3. 6. Coudreau. 18a. Lindley. 12. Hawtayne, p. 387. 38. Wiesner, p. 87. 7. DaGama.

### ANATOMICAL CHARACTERS.

*Transverse Section.*—Mottled.

*Pores.*—Visible with the naked eye on account of their size and their broad borders of soft tissue; large, not diminishing during season's growth; little variation; nearly all single, a few

paired; round; evenly distributed, imbedded in the soft tissue. Few in number; contents often sparkling.

*Rays*.—Visible with the lens; very fine; of one kind; uniform; regular, about the width of a Pore apart; lighter in colour than the ground tissue; avoiding the Pores.

*Rings*.—Ill-defined; boundary, an interruption in the succession of the bands of soft tissue, here and there; contour regular.

*Soft Tissue* of definite arrangement; type of Andira (27a. Pl. VI., fig. 52), Irriariadanni No. 42, and Dakama No. 20. Bold and conspicuous light-coloured patches, sometimes lozenge-shaped when isolated, or running together to form continuous lines which broaden at the Pores and contract again between them. The S.T. occupies about  $\frac{2}{3}$  of the whole of the wood.

*Radial Section* lighter in shade than the Transverse. The Pores are coarse, red, open, chambered grooves bordered by white, soft tissue. The Rays are scarcely perceptible as small transparent-looking flakes. The Rings are not indicated.

*Tangential Section* as the Radial, but the S.T. appears in bolder white streaks, and the Rays as very minute white lines, only visible with the lens, and are about .25 m/m. high.

*Type Specimen*.—Authenticated by Bell, No. 9/2665.

## 10.—CHÆTOCARPUS sp.

*Nat. Ord.*, EUPHORBIACEÆ. *Native Name*, "BOOBOORABALLI" (2).

*Salient Features*.—A tough, solid, fine, close-grained wood of medium weight and hardness, with a satiny lustre and uniform red-brown colour.

*Physical Characters*.—Weight (so far recorded), 52 $\frac{1}{4}$  lbs. per cubic ft. Hardness, Grade 6, firm; compare Beech. Smell when dry 0. Taste flat. Apparently a Sapwood tree. My specimen, which is from a tree 11 ins. in diameter, is all Sapwood. Heartwood darkens a little upon exposure to the air. Surface lustrous.

*Bark*.— $\frac{1}{16}$ – $\frac{1}{8}$  in. thick, scaling in long, thin, oblong flakes, exposing the red inner layer. Inner surface ridged with spindle-shaped ribs. Surface of log beneath bark grooved and glistening with minute gum-drops.

*Uses, Qualities, etc.*—"Furniture—easily procurable in logs up to 50 ft. in length, squaring 12 ins." (2). Rather hard to saw; takes nails fairly well; planes easily and well; turns moderately easily and finishes indifferently. A prettily-marked wood resembling Maple, with which it might compete in the matter of appearance.

*Authority*.—2. Bell, p. 3.

## ANATOMICAL CHARACTERS.

The same as those of Kakeralli No. 45, cf. Stone, Fig. 9, Pl. 73 (27a), with the following differences:—



*Transverse Section*:—

*Pores*.—Visible with the unaided eye to good sight, as fine punctures; not diminishing in size towards the close of the season's growth, but enlarging greatly as the tree ages. Unevenly distributed, appearing to fall into straggling lines; very few in number; single or in groups of 2-5 Pores. They appear dark in the solid wood except when their contents are white.

*Soft Tissue* of definite arrangement; type of Lecythis; in concentric lines about the same thickness as the Rays.

*Type Specimens*.—Authenticated by Bell, No. 10/1666. Imp. Inst., No. 0162.

## 11.—PARINARIUM CAMPESTRE. AUBL.

*Nat. Ord.*, ROSACEÆ.

*Alternative Names*.—"Buhoorada" (2); "Parinari in Brazil" (21); "Petit Parinari, Nefle" (1).

*Salient Features*.—A hard, cold, yellowish wood of quite uniform colour.

*Physical Characters*.—Weight (so far recorded), 54 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Smell 0. Taste little, like Cedar.

*Colour* as above. Query, a Sapwood tree, judging from my specimen, which is 12 ins. in diameter, and all Sapwood. "The colour of light Mahogany" (2). This statement does not agree with the specimen, but perhaps the tree forms a Heartwood at a greater age, as does Washiba, another species of Parinarium. Darkens but little on exposure to the air. Surface bright.

*Bark*.—"Grey, fissured and wrinkled" (1). Surface of log beneath bark, smooth or finely ribbed.

*Uses, Qualities, etc.*—"Furniture and framing—readily procurable in logs up to 40 ft. in length, squaring 12-14 inches" (2). Rather hard to work. Fissile, takes nails badly. Planes moderately hard but well. Turns hard and badly. Polishes indifferently. Of no export value. Sometimes confused with Burada or Buradeah, No. 13, and Barada-balli, No. 7, on account of the similarity of name.

*Authorities*.—1. Aublett, p. 518. 2. Bell, p. 4. 12. Hawtayne, p. 387. 20. McTurk, p. 6. 21. Miers.

## ANATOMICAL CHARACTERS.

Superficially resembling those of Lecythis, Nos. 45 and 90, cf. Stone (27a). Fig. 73, Pl. IX.

*Transverse Section*.—Quite as light in colour as the other sections.

*Pores*.—Easily visible with the naked eye as holes; very large, diminishing within the season's growth but (?) inwards or outwards (see note to Rings below); unusually great variation. Evenly distributed, though the great difference in size makes some zones appear less or more crowded. Nearly all single, a few pairs or groups; oval in shape when large. Many are filled with light-coloured gum.

*Rays*.—Visible with the lens; very fine; as many as four to six in the width of a Pore and interrupted by them.

*Rings*.—Not defined; boundary doubtful. For this reason it is not possible to say whether the Pores increase or diminish in size towards the close of the season's growth, *i.e.*, towards the outside of the Ring. Many tropical woods reverse the order familiar in the woods of temperate climates.

*Soft Tissue* of definite arrangement; type of *Pterocarpus*; in sub-continuous, concentric lines.

*Pith*.—(?)

*Radial Section*.—The Pores are rather prominent, many being large. The Rays lack contrast, are scarcely visible. The soft tissue is scarcely visible without lens, but produces a matt effect on the surface by means of the innumerable, extremely fine, close, parallel, vertical lines.

*Tangential Section* as the Radial, or approximately so.

*Type Specimens*.—Authenticated by Bell, No. 11/2667.

## 12.—MIMUSOPS GLOBOSA. GAERTN.

*Nat. Ord.*, SAPOTACEÆ.

*Synonyms*, "M. Balata. Crueg. Sapota Muelleri. Lindl.  
"Achras Balata" (10).

*Alternative Names*.—"Bullet-wood, Bully Tree, Balata, Bollitree, Bulêtre, Melkhout, Balata rouge, possibly also *Pferdefleischholz*" (26); "Balata saignant, Balata des Galibis" (5a); "Massaranduba, Baromé, Barueh, Purgo in Brazil" (7); "Buruck" (2). In Cat., Col., Fr. (5), four Balatas (species uncertain) are mentioned, viz., B. indien, B. franc, B. saignant and B. montagne. "Beefwood" (28). "Manil-kara, Bois de Nate" (1). "Belletree" in Surinam; "Paardenbesh" Portugese (20c).

*Salient Features*.—A very hard, heavy, deep red or flesh-red coloured wood of moderately fine grain.

*Physical Characters*.—Weight (so far recorded),  $55\frac{1}{4}$ -68 lbs. per cubic ft. Hardness, Grade 1, excessively hard; compare Ebony. Smell when sawn, little but curious. Taste 0. Solution deep crimson. Surface bright. Colour of Sapwood brown, sharply defined from the Heartwood; width  $1\frac{3}{4}$ - $2\frac{1}{4}$  ins.

*Bark*.—About  $\frac{1}{4}$  in. thick, flaking in long, narrow scales; reddish and woody with a fibrous bast. Surface of log beneath Bark finely striated.

*Uses, Qualities, etc.*—"Windmill-arms, posts, house-building—very durable, stands exposure, suffers from *Teredo* and worms" (22). "Suitable for pile-work (!)—scarce" (2). Fades or darkens a little on exposure to the air. Fissile, takes nails badly; planes hard but well; turns moderately hard but indifferently. Specimen is from an inferior log; much better results can be obtained with better qualities. A well-known marketable wood of

considerable value. Sometimes confused with Bastard Bulletwood, No. 86, and with Barataballi, No. 8, on account of similarity in the local names, colour and other physical properties.

*Authorities.*—1. Aublett, p. 308. 2. Bell, p. 4. 5. Cat. Col., Fr., pp. 26, 148. 5a. Charpentier, p. 156. 7. DaGama. 10. Devenish. 20. McTurk, p. 4. Martin-Lavigne (20c), p. 141. 27a. Stone, p. 148, Pl. X., fig. 83. 28. Wiesner, p. 879.

#### ANATOMICAL CHARACTERS.

Similar to Hymarikushi, No. 40; Mamooriballi, No. 61; Moraballi, No. 66; Morakokuru, No. 68, and nearly all Sapotaceous woods. Cf. frontispiece No. 40.

*Transverse Section.*—Much darker in shade than the other sections.

*Pores.*—Prominent on account of their masses; little variation. Irregularly distributed in a tree-like pattern, appearing like long strings. The true groups are radially disposed, of two to seventeen Pores, compactly arranged; 20-35 per sq. m/m. They contrast but little with the ground except when filled with a white substance.

*Rays.*—Visible with the lens, small; uniform; regular, rather less than the width of a Pore apart; very numerous, 10-15 per m/m.; weak but otherwise straight.

*Rings.*—Doubtfully defined; boundary (if any), the lines of soft tissue. These, however, appear too much interrupted and irregular.

*Soft Tissue* of definite arrangement; type of most woods of the same order, in concentric, undulating, irregular, interrupted, brown lines about the thickness of the Rays; often mere angles or scraps. Also sheathing the Pores; in which case its colour is lighter than that of the concentric lines.

*Pith.*—(?)

*Radial Section.*—Uniform in colour. The Pores are small but readily visible as hoary (not black) scratches with red contents. The Rays are minute, obscure, shining flakes of the same colour as the ground. The Rings are not indicated.

*Tangential Section* as the Radial, but the Pores are apparently sinuous. The Rays need the microscope, being minute, and are only visible in the solid wood, after moistening; they then appear as brown lines of one row of cells, about 0.1 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 12/2668; Laslett No. 2311; Imp. Inst., No. 0157; Berkhout, No. 2624. This last has larger Pores and is doubtfully of this species.

### 13.—NECTANDRA CUSPIDATA. NEES AND MART.

*Nat. Ord.*, LAURINEÆ.

*Synonym*, OCOTEA CUSPIDATA. MART.

*Alternative Names.*—"Burada, Buradeah" (2); "Bastard Cirouaballi" (2)

*Salient Features.*—A light, soft wood with a lustrous surface and uniform greenish or yellowish colour.

*Physical Characters.*—Weight (so far recorded),  $26\frac{1}{2}$  lbs. per cubic ft. Hardness, Grade 7, soft; compare Alder. Smell and taste 0.

*Colour* as above, but it is doubtful whether there is any distinction between the Heartwood and Sapwood. It is probably a Sapwood tree. The wood darkens but little on exposure to the air. The width of the Sapwood, if Heartwood is ever produced, will exceed 6 ins. Surface brilliant and satiny.

*Bark.*—About  $\frac{1}{8}$  in. thick; smooth; reddish-brown; full of small white bodies (lens needed); friable. Surface of log under bark striated.

*Uses, Qualities, etc.*—"Suitable for inside wall-boarding. Is readily procurable in logs up to 30 ft. in length, and squaring 8-9 ins." (2). Takes nails well, but will not hold them. Planes and turns easily but badly; polishes well. An inferior wood of no export value, but which may find uses in the Colony on account of the ease with which it can be worked. Its appearance is good, as its lustre is so rich, but its durability is doubtful. Sometimes confused with Boohoorada, No. 11, Barada-balli, No. 7, and Barataballi, No. 8, on account of the similarity of the names; also with Oolu, No. 69, and Yellow Cirouaballi, because of their general resemblance.

*Authorities.*—2. Bell, p. 4.

#### ANATOMICAL CHARACTERS.

Similar to other Nectandras, more especially of Yellow Cirouaballi, No. 18, and Pl. No. 89, frontispiece. The points of difference are as follows:—

*Transverse Section:*—

*Pores.*—Visible to the naked eye.

*Rays* also visible.

*Rings* not define.

*Radial Section.*—The Pores appear darker than the wood. The Rays are readily visible but small, brownish flakes.

*Tangential Section* as the Radial, but if anything the surface is more satiny. For other details the description of No. 18 should be consulted.

*Type Specimen.*—Authenticated by Bell, No. 13/2669.

#### 14.—CARAPA GUIANENSIS. AUBL.

*Nat. Ord.*, MELIACEÆ.

FRONTISPIECE NO. 14.

*Synonym*, C. GUAYANENSIS. AUBL.

The wood described under the name of C. guianensis by Martin-Lavigne is incorrectly named.

*Alternative Names.*—"Highland Crabwood, Caraba (Red)" (2); "Andiroba branca, Caraipa" (21); "Krapaboom" (8); "Carapa, Andiroba" (1); Arbre à huile de la Guyane Fr. (20c);

*Salient Features.*—A red wood resembling Mahogany, or, in inferior qualities, the Havana or cigar-box Cedar; soft and lustrous.

*Physical Characters.*—Dry-weight (so far recorded),  $38\frac{1}{2}$  to  $46\frac{1}{4}$  lbs. per cubic ft. Hardness, Grade 6 to 7, firm to soft. Smell when dry 0. Taste slightly astringent.

*Colour* of Sapwood the same, but considerably paler than that of the Heartwood and passing gradually into it. Width of Sapwood  $1\frac{1}{2}$ - $2\frac{1}{2}$  ins. Miers (21) says that the Heartwood is "whitish." This must be an error, as even the light-coloured Sapwood cannot be termed whitish.

*Bark.*—About  $\frac{1}{8}$  in. thick, hard, woody; dark brown within, smooth outside, something like that of Sycamore. A layer of red bast. Surface of log under bark, smooth.

*Uses, Qualities, etc.*—"Shipbuilding and carpenter's work—masts for ships, on account of its toughness—60 to 80 ft. by 3 to 4 ft. in diameter" (21). Saws easily; takes nails fairly well; planes easily but indifferently; turns moderately easily; polishes indifferently. The better qualities may pass for a medium Mahogany, and are doubtless often sold under that name. Generally confused (with reason) with the next number, which appears to be merely a variety; also with Caraba-balli, No. 16, on account of the similarity in the names; also with Mahogany and the so-called "Cedars" on account of their close resemblance.

*Authorities.*—2. Bell, p. 4. 3. Berkhout, p. 53. 20c Martin-Lavigne, p. 74. 21. Miers. 27a Stone, p. 38, Pl. III., fig. 24.

#### ANATOMICAL CHARACTERS.

The same as most of the Mahogany-like woods belonging to the Meliaceæ.

*Transverse Section.*—Darker in shade than the other sections.

*Pores.*—Readily visible with the unaided eye as holes; some variation in size; irregularly distributed, more numerous in some zones than in others; mostly single, a few pairs and threes.

*Rays.*—Visible with the lens, very fine; red; uniform; regular, about the width of a Pore apart; not avoiding the Pores.

*Rings.*—Ill-defined; boundary a fine line of soft tissue (lens); contour regular.

*Soft Tissue* (?) little beyond that in the boundary line.

*Radial Section.*—Darker in shade than the Tangential Section on account of the deep colour of the Rays. The Pores are clear grooves, often twinned; bright as though varnished inside. The Rays are small, but conspicuous, flakes. The Rings are difficult to trace.

*Tangential Section* as the Radial, but owing to the absence of twinned Pores it appears much finer in the grain. The Rays are just visible as a fine hatching, and the Rings as dark loops when they cut the section (which they may not do in a small specimen). The Rays are about 1 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 15/2671. Imp. Inst., 0460. This tree produces the "Mote or Kundoo-nuts."

### 15.—CARAPA GUIANENSIS (see last number).

#### FRONTISPIECE No. 15.

This wood is simply a variety of the last-mentioned species; in fact, Mr. Spence, who assisted in the collection of these woods, says that the two are the same. In Mr. Bell's report they are dealt with separately.

*Alternative Names for this Variety.*—"Lowland Crabwood, Caraba" (White) (2); "Andiroba branca, Caraipa" (21).

This wood has a wider and more sharply defined Sapwood, otherwise all characters agree with No. 14.

*Authorities.*—2. Bell, p. 4. Spence, M.S. communication.

*Type Specimens.*—Authenticated by Bell, No. 15/2671.

### 16.—NOT IDENTIFIED.

*Nat. Ord., MELIACEÆ. Native Name "CARABA-BALLI" (2).*

*Salient Features.*—A light, soft, stripy light reddish or brown wood of rather coarse grain.

*Physical Characters.*—Weight (so far recorded), 59 lbs. per cubic ft. Hardness, Grade 6, firm; compare Beech. Smell when dry 0. Taste flat.

*Colour of Heartwood* as above. "Resembles White Caraba" (2). Darkens little, if at all, upon exposure to the air. Sapwood, oatmeal colour, gradually passing into that of the heart. Surface dull to bright. Width of Sapwood 2-3 ins.

*Bark.*—About  $\frac{1}{8}$  in. thick; smooth, or lightly fissured and wrinkled. Light, soft, fibrous and bast-like within. Surface of log beneath bark finely ribbed, covered by thin, fibrous bast.

*Uses, Qualities, etc.*—"Used for the same purposes as White Caraba, No. 15—readily procurable, squaring up to 14 ins. by 30-40 ft. in length" (2). Fissile, takes nails badly; planes easily but indifferently; turns easily but badly; polishes but moderately well. Export value doubtful. Sometimes confused with the Carabas, Nos. 14 and 15, on account of the similarity of the colour and name. The structure is, however, entirely different.

*Authority.*—2. Bell, p. 4.

#### ANATOMICAL CHARACTERS.

Similar to those of Manniriballi, No. 63, and of Chlorophora (Fustic), (Stone 27a. Pl. XIII., fig. 111).

*Transverse Section.*—About the same depth in colour as the other sections.

*Pores.*—Readily visible with the naked eye, on account of their mass and light colour; rather large, not diminishing towards the close of the season's growth, but considerable variation in no particular order; increasing as the tree ages, but not

abnormally so. Evenly distributed, widely scattered; mostly single, many pairs and some groups of 3-7 pores.

*Rays*.—Visible with the lens; very fine; uniform; regular, about the width of a Pore apart or a little less, lightly avoiding the Pores.

*Rings*.—Well defined; boundary a zone of Pore-less and denser wood; contour regular. Nine rings per inch of radius in my specimens on an average.

*Soft Tissue* of definite arrangement; type of Chlorophora (see above). In conspicuous, light-coloured zones embedding the Pores, and here and there broken up to mere wings to them.

*Pith*.—(?)

*Radial Section*.—The Pores are few but coarse, empty grooves, frequently twinned. They bleed after a time and stain the surface. The Rays are narrow, inconspicuous flakes. The Rings are not indicated. The soft tissue is responsible for the "coarse-grained" appearance of the wood, rather than the Pores.

*Tangential Section* as the Radial, but the soft tissue tends to become more prominent, and the Rays need the microscope, being minute and about '25 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 16/2672.

#### 17.—NECTANDRA SP.

*Nat. Ord.*, LAURINEÆ. Near NECTANDRA PISI AND WANA.

Not the wood described by Martin-Lavigne (20c), p. 66, as Pisi.

*Alternative Names*.—"Dark Cirouaballi; Brown Cirouaballi" (12). "Siruaballi; Silverballi" (2). Subilereballi (12).

*Salient Features*.—A Cedar-brown to dark brown wood, with patches of black here and there. Moderately coarse-grained, and having a smell something like Sandal-wood when sawn.

*Physical Characters*.—Weight (so far recorded),  $49\frac{1}{2}$ - $56\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 3, very hard, compare Blackthorn. Smell as above, objectionable to some. Taste slightly astringent. Solution in boiling rain-water colourless, afterwards with alcohol, pale brown. Heartwood darkens a little on exposure to the air. Colour of Sapwood light brown; width  $\frac{3}{4}$ - $1\frac{1}{4}$  ins. Surface lustrous.

*Bark*.—About  $\frac{3}{8}$  in. thick, hard, with shallow fissures; full of pale, hard, rod-like bodies. Closely adherent.

*Uses, Qualities, etc.*—"Boat-building, for which it is specially adapted" (12). A serviceable, though not very ornamental wood. Turns well when of good quality. Planes moderately easy. Polishes well. "Can be met with in logs up to 90 ft. long by 36 ins. square" (22). "Not plentiful—averages 50-60 ft. in length, squaring 18-20 ins." (2). Not of sufficient value for export. Sometimes confused with other Cirouaballis.

*Authorities*.—2. Bell, p. 4. 9. Dalton, p. 283. 12. Hawtayne, p. 388. 17. Laslett, p. 451. 20. McTurk, No. 50. 22. Morris. 27a. Stone, p. 180. Pl. XI., Fig. 99.

## ANATOMICAL CHARACTERS.

As those of other Nectandras. Cf. No. 89, Frontispiece.

*Transverse Section*.—Darker than the radial.

*Pores*.—Conspicuous on account of their size and colour, coarse; little variation. Some single, many sub-divided groups of five or even ten Pores. Evenly distributed, oval; few, 9-22 per square m/m. The arrangement sometimes suggests loose, straggling lines. Dark resin is occasionally present in them.

*Rays*.—Just visible with the naked eye; fine, uniform, regular; equi-distant, less than the width of a Pore apart; many, 6-8 per m/m.; avoiding the Pores, otherwise straight.

*Rings*.—Doubtful; zones of darker and lighter colour here and there, and occasionally a zone of more closely-packed Pores; contour regular.

*Soft Tissue*.—Of definite arrangement, in very small lines or patches close to the pores and encircling them.

*Radial Section*.—Lighter in shade than the other sections. The Pores are prominent, dark, sometimes blackish lines, coarsely chambered and containing drops of resin. The Rays are rather prominent as small dull flakes.

*Tangential Section* as the Radial, but the Rays need the lens, being minute dark lines about 5 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 17/2672. Imp. Inst., No. 0232.

## 18.—NECTANDRA SP.

*Nat. Ord.*, LAURINEÆ.

It is reputed to be *N. pisi*, and it is on the strength of this, and also of comparison with Berkhout's specimens, that the alternative names are given. It is not the wood described by Martin-Lavigne (20c), p. 66, which may or may not be correctly named.

*Alternative Names*.—"Yellow Cirouaballi" (20); "Black Cedar" (4a); "Yellow Siruaballi; Yellow Silverballi; Yakooro" (2); "Pisie" (3a); "Yakooroo" (14); "Yakooro Cirouaballi" (12).

*Salient Features*.—A light brown, fine, even-grained wood with a spicy taste, like that of cigar-box (Havana) Cedar.

*Physical Characters*.—Weight (so far recorded), 37-52 lbs. per cubic ft. Hardness, Grade 3, very hard. Smell when worked like that of certain kinds of Cedar or Callitris. Taste as above. Surface bright, almost lustrous. Heartwood darkens but little on exposure to the air. Colour of Sapwood, dirty white; width about 1 in., well defined from the Heart.

*Bark*.—About  $\frac{1}{4}$  in. thick; smooth, reddish, coarsely fibrous within. Smells like camphor when broken.

*Uses, Qualities, etc.*—"As planking for boats it is most durable" (20). Hard to saw. Fissile, takes nails badly. Planes and turns easily and polishes well. Apart from its beautiful surface it



cannot be called an ornamental wood, and is of doubtful value for export. Sometimes confused with other *Cirouaballis* (*Nectandras*).

*Authorities*.—2. Bell, p. 4. 3a. Berkhout, p. 6. 4a. Boulger, p. 424. 12. Hawtayne, p. 387. 17. Laslett, p. 451. 20. McTurk, No. 60. 27a. Stone, p. 177.

#### ANATOMICAL CHARACTERS.

As those of other species of *Nectandra*. Fig. 89, Frontispiece.

*Transverse Section*.—Much darker than the other sections.

*Pores*.—Clear, scarcely prominent, rather coarse, little variation; evenly distributed, but with a slight tendency to form loose, straggling, oblique lines. Some single, mostly sub-divided in compact groups of 4-5 Pores; few 9-15 per square m/m.; glistening at times.

*Rays*.—Need lens, fine, uniform, almost equi-distant, slightly less than the width of a large Pore apart, and slightly avoiding them; many 7-9 per m/m.

*Rings*.—Very regular bands of light and shade, corresponding with certain zones of pores when they form straggling lines, but nothing of the nature of a true boundary line; contour regular.

*Soft Tissue* of no definite arrangement; very little; narrowly encircling the Pores, and a few lines of single cells here and there.

*Pith* (?)

*Radial Section*.—Much lighter in shade than the transverse, brilliant; a greenish tinge occasionally. Pores rather prominent, coarse, colourless, chambered grooves, containing drops of resin or gum, which look like silver beads under the lens. Rays visible in certain lights; very inconspicuous flakes. Rings vague or rarely indicated.

*Tangential Section*.—As the Radial, but a little darker. Rays minute, on the limit of vision; about 5 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 18/2674. Imp. Inst., No. 0233. Berkhout, Nos. 2623, 2627.

#### 19.—NOT IDENTIFIED.

*Nat. Ord.*, MELIACEÆ according to AIKEN.

*Alternative Names*.—"Dalli" (2); "Dali; Dari" (3c); "Voi-rouchi; Virola; Jeajeamadou; Dayapa" (1); Vayamadou de montagne" (20a). Not the "Jeamadou" described by Martin-Lavigne (20c) under the name of *Virola surinamensis*. Warb.

*Salient Features*.—A coarse, soft, light, lustrous wood of an uniform reddish grey or dirty white colour.

*Physical Characters*.—Weight (so far recorded), 29 lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell 0. Taste flat. Heartwood, if any, scarcely defined from the Sapwood; surface brilliant on a cleft section. Colour "blanchâtre" (1). This is probably a Sapwood tree.

*Bark*.—(?).

*Uses, Qualities, etc.*—"Peu compacte" (1); "Match boxes and cheap coffins, and, if thoroughly cured, for inside boarding" (2). Saws very easily; takes nails well; planes badly, being extremely fissile in a radial direction. Even when the surface is not parallel to the Rays, strips of wood rip out, exposing the silver-grain in a most unusual manner. Turns easily but badly; unsuitable for polishing. Export value, nil.

*Authorities.*—2. Bell, p. 4. 3c. Blume, p. 143. 5. Cat., Col., Fr., p. 30. Aiken, MS. with specimen.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—Not much darker than the other sections.

*Pores.*—Just visible with the naked eye, rather large; not diminishing towards the close of the season's growth; little variation except in the groups; single, or sub-divided pairs; evenly distributed; few and widely scattered; contents often black.

*Rays.*—Visible with the lens, shining, small, uniform, regular, rather less than the width of a Pore apart, lightly avoiding the Pores.

*Rings.*—Not defined; boundary doubtful.

*Soft Tissue* of no definite arrangement.

*Pith.*—(?)

*Radial Section.*—The Pores are prominent, rather darker grooves. The Rays are similar in appearance to the Pores with the unaided eye. The ground tissue is unusually lustrous.

*Tangential Section* as the Radial, but duller, though somewhat frosted; the Rays need the lens, being minute and about 1 m/m. high; under the microscope they are seen to be filled with drops of dark gum.

*Type Specimens.*—Authenticated by Bell, No. 19/2675. Aiken No. 3034.

#### 20.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ.

*Alternative Names.*—"Dakama" (2); "Dakama-balli" (12); "Dacama; Bruinhart; Wacapou; Blakka Kabbisi, in Dutch Guiana" (3). Not the "Dacamabally" or "Wacapou" described by Martin-Lavigne (20c), p. 100, under the name of Andira Aubletti. Benth., as is evident from the difference in the bark and the grain.

*Salient Features.*—A hard, heavy, rich red wood of uniform colour. Pores extremely prominent in transverse section, and coarse and open plankwise.

*Physical Characters.*—Weight (so far recorded), 65½-66½ lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew, Morabucquia or Purpleheart. Smell when dry 0. Taste flat. Colour of Heartwood as above, with darker grooves (the open Pores). Darkens considerably on exposure to the air. Ill-defined from the Sapwood into which it gradually merges. Surface bright; rather cold to the touch. Sapwood light brown; about 1-1½ ins. wide.

*Bark*.—About  $\frac{1}{4}$  in. thick; reddish, with large, oval lenticels. Flakes off in rather large, irregular scales, which are marked off in transverse section in an unusually plain manner. Inner layer hard, fibrous. Closely adherent. Surface of log beneath Bark ribbed.

*Uses, Qualities, etc.*—"More lasting than Wallaba—said by wood cutters to be a splendid building wood—readily procurable in logs of 25-30 ft. in length, squaring 12-24 ins." (2). Very hard to saw, fissile, takes nails badly, planes hard, turns hard, and polishes indifferently. A handsome wood which may find a market in Europe as a furniture wood. Sometimes confused with Barrakarra, No. 9, on account of similarity in colour and of structure.

*Authorities*.—2. Bell, p. 4. 3. Berkhout, p. 26. 12. Hawtayne, p. 385. 17. Laslett, p. 452. 17a. Ibid, p. 288. 20. McTurk, p. 4.

#### ANATOMICAL CHARACTERS.

Similar to those of Barrakarra No. 9 (see this), with the following differences—

*Transverse Section*.—Pores fewer.

*Soft Tissue*.—This occupies much less space in the wood (say  $\frac{1}{4}$ - $\frac{3}{8}$ ) of the transverse surface; chiefly in diamond-shaped patches embedding the pores. When it joins them up to lines, the tendency is to form oblique rather than concentric lines.

*Radial Section*.—Much lighter in shade than the transverse. Pores bordered by inconspicuous, almost imperceptible, grey soft tissue.

*Type Specimen*.—Authenticated by Bell, No. 20/2676.

#### 21.—NOT IDENTIFIED.

*Native Name*, "DETERMA" (2).

*Salient Features*.—A light, soft, very cross-grained, pinkish-red wood of uniform colour.

*Physical Characters*.—Weight (so far recorded)  $35\frac{1}{2}$  lbs. per cubic ft. (Specimen unsound). Hardness, Grade 6, firm; compare Beech. Smell or taste 0. Colour of Heartwood as above; salmon pink; darkens a little on exposure to the air; well defined from the Sapwood; surface dull to glossy. Sapwood, width about 2 ins.; oatmeal colour.

*Bark*.—About  $\frac{1}{2}$  in. thick, smooth or warty, dark reddish-brown within; structure the same throughout; rather woody; full of hard light-coloured fibres. Surface of log under bark, finely striated.

*Uses, Qualities, etc.*—"Planking, boats, railway carriages—masts and spars of vessels, the largest spars for these purposes are of this wood—from 70-90 ft. long. I have seen logs of this timber 42 ins. square" (20). "Readily procurable in logs of 30-40 ft., squaring 12-16 ins." (2). Saws easily, takes nails well, planes indifferently but moderately easily. Finishes badly. On the

evidence of Mr. McTurk, this wood should command a market on the strength of its suitability for spars, etc. Apart from this recommendation, I think that picked logs of this wood may command a sale on their own merits.

*Authorities.*—2. Bell, p. 4. 20. McTurk, p. 3.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—Not much darker than the other sections.

*Pores.*—Visible with the naked eye as perforations, rather large but not prominent, lacking contrast; not diminishing to the close of the season's growth, little variation. Single or sub-divided pairs. Unevenly distributed, being linked up into long, straggling oblique lines.

*Rays.*—Visible with the lens, fine, uniform, irregular, rather less than the width of a Pore apart, lightly avoiding the Pores.

*Rings.*—Not defined; boundary doubtful; contour (?)

*Soft Tissue.*—Of definite arrangement being in the form of rings (sheaths), or patches round the Pores or adjoining them, thus linking them up in long series.

*Radial Section.*—The Pores appear of a deeper red than the wood and as fine, open grooves. The Rays are very inconspicuous; more distinct in the Sapwood. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the microscope, being minute, transparent lines about 2 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 21/2677. There is a wood mentioned in the Guide to British Guiana under the name of "Determa," *Nectandra Wana*, and I have a specimen from Berkhout labelled "Wana," which is not unlike our specimen. The "Wane" described by Martin-Lavigne (20c), p. 136, resembles this species, but he is not satisfied that it is correctly named as *Terminolia buceras*. Hook.

#### 22.—NOT IDENTIFIED.

*Nat. Ord.*, ANACARDIACEÆ, apparently near *TAPIRIRIA*.

*Native Name*, "DUKA" (2).

*Salient Features.*—A light, soft, pinkish or light-brown wood, resembling a very inferior Mahogany or Cedar. There is a tendency of the Pores to bleed and make minute stains upon the surface of the wood.

*Physical Characters.*—Weight (so far recorded) 35½ lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell or taste 0.

*Colour.*—Of Heartwood, darkens slightly on exposure to the air. Surface lustrous. Not defined from the Sapwood, but gradually passing into it. Sapwood the colour of oatmeal, width about 2-2½ ins.

*Bark.*— $\frac{1}{16}$  to  $\frac{1}{8}$  in. thick; smooth with small, oval warts (lenticels); fibrous-laminated within. Surface of the log beneath the Bark, smooth or striated.

*Uses, Qualities, etc.*—"Liable to attack by insects. Is very common, and can be got in logs up to 40 ft. in length, and squaring up to 17 ins." (2). "Useful for indoor house work, tables, etc. There are two or three kinds" (20). The test piece was unsound, and the following must be considered with due regard to this. Saws easily, takes nails fairly well, planes easily and well, turns indifferently and polishes well. Of doubtful value for export, though it might compete with the common Mahoganies known as "Baywoods." Sometimes confused with Dukalaballi, No. 23, on account of the similarity of the names.

*Authorities.*—2. Bell, p. 5. 20. McTurk, p. 5.

#### ANATOMICAL CHARACTERS.

Similar to those of Surádanni, No. 84. Compare No. 14 Frontispiece.

*Transverse Section.*—Darker in shade than the other sections.

*Pores.*—Visible to good sight as minute holes, large, considerable variation. Evenly distributed, few and widely scattered; single, also many sub-divided groups of 2-3 Pores.

*Rays.*—Just visible with the naked eye, uniform, irregular, less or more than the width of a Pore apart, lightly avoiding the Pores; reddish.

*Rings.*—Apparently defined; boundary (?). Contour regular. *Soft Tissue* of no definite arrangement.

*Pith.*—(?)

*Radial Section.*—Brilliant. The Pores are fine, brownish scratches, darker than the wood (see above). The Rays are readily visible and slightly browner or redder than the wood. The Rings are not indicated.

*Tangential Section.*—As the Radial, but lacking its brilliance. The Rays are minute, but yet give a matt appearance to the surface. They are about  $\frac{1}{5}$  m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 22/2678.

#### 23.—FICUS. sp.

*Nat. Ord.*, URTICACEÆ. *Native Name*, "DUKALABALLI" (2).

*Salient Features.*—"A dark brown, fairly close-grained, heavy, hard wood."

*Physical Characters.*—Weight (so far recorded)  $47\frac{3}{4}$ - $56\frac{1}{2}$  lbs. per cubic ft. (my specimen is mostly Sapwood). Hardness, Grade 2, extremely hard; compare Boxwood. Smell or taste 0.

*Colour* of Heartwood, dark brown; a purplish tinge at times; darkens but little on exposure to the air. Sharply defined from the Sapwood. Surface bright. Sapwood yellowish-white; width  $3\frac{1}{2}$ -4 ins.

*Bark.*— $\frac{1}{8}$ - $\frac{1}{4}$  in. thick, smooth like that of Beech, with prominent raised, horizontal lines (lenticels). Hard, woody and brown within. Surface of log beneath Bark striated or finely ribbed.

*Uses, Qualities, etc.*—"Large sizes, but very scarce, was formerly used for bed-posts" (2). "Takes a fine polish and is a durable wood, average height about 120 ft.; will square free of Sap 20 ins." (20). Rather hard to saw, takes nails badly, fissile, planes and turns moderately hard and well. Polishes well. A handsome furniture wood, which, except for its scarcity, might be worth attention. It would not compete with the well-known Purpleheart, No. 74. Sometimes confused with Duka, No. 22, and the Purplehearts, on account of similarity of name on the one hand and of colour on the other.

*Authorities.*—2. Bell, p. 5. 20. McTurk, p. 5.

#### ANATOMICAL CHARACTERS.

Similar to those of Purpleheart and No. 74 of this collection, with the following differences:—

*Transverse Section.*—Darker than the other sections.

*Pores.*—Visible with the naked eye when their contents are white, *i.e.*, when they contain chalky matter.

*Rays.*—Visible with the naked eye to good sight. Width about the same as the thickness of the walls of the Pores. Red.

*Rings.*—Very ill-defined; boundary (?), a vague whitish line (rare); but there are frequent zones of denser wood. (In Purpleheart the wood does not vary much from zone to zone, as in this wood).

*Soft Tissue* of definite arrangement; type of *Copaifera*, but not to be made out with the naked eye. It is not well developed, and has to be sought for. More particularly the narrow, fragmentary wings to the Pores are red, and therefore are difficult to see against the similarly-coloured ground.

*Radial Section.*—Not much lighter in shade than the other sections. The Pores are fine scratches filled with chalky matter. The Rays are narrow, inconspicuous flakes. The soft tissue is imperceptible without lens. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute, affecting the appearance as do those of Mahogany, and are  $\frac{3}{4}$  to 1 m/m. high.

*Type Specimen.*—Authenticated by Bell, No. 23/2679. Rodway mentions a "*Ducalliballi*" under the name of *Sideroxylon* sp. A specimen sent me by Rev. J. Aiken labelled "*Ficus* sp.," corresponds in every way with our species, and as the leaves accompanying it are those of a *Ficus*, we think that we may venture to place it in that genus. At the same time the wood is utterly unlike that of any of the twenty-two species in our possession.

#### 24.—NOT IDENTIFIED.

*Nat. Ord.*, SAPOTACEÆ. *Native Name*, "DUKURIA" (2).

*Salient Features.*—A soft, light wood resembling white Pine.

*Physical Characters*.—Weight (so far recorded), 33½ lbs. per cubic ft. Hardness, Grade 8, very soft; compare white Pine. Taste or smell 0.

*Colour* yellowish white. Apparently a Sapwood tree. My specimen, all Sap, is from a log 10 ins. in diameter. Surface bright (not brilliant).

*Bark*.—About ¼ in. thick, wrinkled (or lightly fissured), warty, hard and woody; light brown in section; scaling in irregular flakes, exposing the red inner layer. Surface of log beneath Bark smooth or striated.

*Uses, Qualities, etc.*—"Tall trees squaring up to 16 ins. Uses, much the same as Dalli, No. 19" (2). Takes nails well, works easily but badly; not suitable for polishing. Of doubtful value for export.

*Authority*.—2. Bell, p. 5.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—A little darker than the other sections.

*Pores*.—Scarcely visible with the naked eye, not diminishing towards the close of the season's growth, little variation. Evenly distributed, singly or in sub-divided groups of 2-7 Pores; widely scattered, but there is a suggestion of loose, straggling lines.

*Rays*.—Just visible with the naked eye, very fine; uniform; almost regular, mostly the width of a Pore apart or more, and scarcely avoiding them.

*Rings*.—Ill-defined; boundary (?); a narrow zone of laxer wood at intervals; contour regular.

*Soft Tissue* of definite arrangement, fine, irregular (roughly concentric), bars between the Rays (needs microscope).

*Pith*.—(?).

*Radial Section*.—A little lighter in shade than the transverse. The Pores are fine, colourless scratches. The Rays are fine, almost colourless, transparent lines. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute, spindle-shaped, large-celled lines, about 1 m/m. high.

*Type Specimen*.—Authenticated by Bell, No. 24/2680.

#### 25.—NOT IDENTIFIED.

*Alternative Names*.—"Eda-balli, Wild Calabash" (2).

*Salient Features*.—A reddish-brown wood of uniform colour and medium weight and hardness.

*Physical Characters*.—Weight (so far recorded), 47 lbs. per cubic ft. Hardness, Grade 6, firm; compare Oak. Smell or taste 0.

*Colour of Heartwood* as above; sometimes light brown; darkens but little on exposure to the air; not defined from the Sapwood. Surface bright, inclined to appear frosted. (?) A Sapwood tree.

*Bark*.—About  $\frac{1}{4}$  in. thick, brown, inner layer very thin, dark brown and fibrous; outer layer lighter in colour, crumbling, and smooth without. Closely adherent. Surface of log beneath bark, smooth.

*Uses, Qualities, etc.*—"Has the great advantage of not splitting. Has been used for gun-stocks—not plentiful—is a small tree squaring from 8-10 ins." (2). Works easily and well; polishes indifferently. Of little value for export. Sometimes confused with *Eta-balli* on account of the similarity of name.

*Authority*.—2. Bell, p. 5.

#### ANATOMICAL CHARACTERS.

Those of Kurahara, with the following differences. (Compare No. 57 and No. 59, Frontispiece.)

*Transverse Section*.—Not much darker than the other sections.

*Pores*.—Just visible with the naked eye as holes.

*Rings*.—Doubtful; boundary (?) a narrow zone of denser wood here and there; contour regular.

*Soft Tissue* of definite arrangement; type of Bullet-wood, No. 12 (cf. 27a., p. 148. Pl. X., fig. 83). A series of fine, close, numerous, concentric lines of slightly undulating contour, rather broader than the Rays, and making a network with them.

*Radial Section*.—Brilliant. The Pores are exposed in pairs or threes, hence the grain appears coarse; darker than the ground. The Rays are fine, lustrous, crystalline, very narrow bars. The Rings are not indicated. The Soft Tissue appears as very fine, parallel striations.

*Tangential Section* as the Radial, but not brilliant, hardly lustrous. The Rays need the microscope, being minute.

*Type Specimens*.—Authenticated by Bell, No. 25/2681.

### 26.—VOCHISIA TETRAPHYLLA D.C. (Probably).

*Nat. Ord.*, VOCHISIACEÆ.

VOCHYA, VOCHY, VOCHYSIA ARE SYNONYMOUS WITH VOCHISIA.

*Native Name*, "ETA-BALLI" (2). N.B.—NOT ITA-BALLI.

*Salient Features*.—A light, soft wood of a uniform pinkish (reddish-brown) colour and pretty silver-grain.

*Physical Characters*.—Dry weight (so far recorded), 47 $\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 7, soft, compare Pine. Smell when dry 0. Taste 0. Heartwood darkens a little on exposure to the air.

*Colour* of Sapwood similar to that of the Heartwood but lighter (whiter or greyer), not defined from the Heartwood, but merging into it; width about 1 in. Surface clean.

*Bark*.— $\frac{1}{4}$ – $\frac{1}{2}$  in. thick. The outer, lightly fissured brown layer flakes off and exposes the quite smooth, terra-cotta-coloured inner



layer. Between these is a very thin layer of a nearly white colour. Surface of log under bark striated.

*Uses, Qualities, etc.*—"Readily procurable in lengths up to 60 ft., and squaring up to 14 ins.—said to last well in salt water" (9a). "Barrel staves; not durable; easily worked" (131). Planes very badly, resists the tool; turns hard and badly; polishes badly. Of little export value, but might serve as a substitute for common "Baywood." Sometimes confused with Eda-balli, No. 85, and Ita-balli; also possibly with the Eta Palm, on account of similarity of name.

*Authorities.*—2. Bell, p. 5. 13. Hawtayne, p. 385. 21. Miers. 24b. Roth. 28. Wiesner, pt. II., p. 97.

#### ANATOMICAL CHARACTERS.

Similar to those of Hymarikushi, No. 40, but on a larger scale; also to many Acacias, for instance *Acacia Pendula*, cf. Stone (27a), p. 78, Pl. V., fig. 43.

*Pores.*—Prominent, visible with the unaided eye, large, not diminishing towards the close of the year's growth; a little variation in no particular order. Evenly distributed over the whole section; mostly empty; groups of three or four rare (occasionally on the boundary line).

*Rays.*—Just visible with the unaided eye; red. Perhaps of two kinds; irregular, unevenly spaced, the small ones much less than the width of a Pore apart, the large Rays more. Undulating, avoiding the Pores; tapering to fine ends (perhaps the small Rays are the fine ends of the larger Rays).

*Rings.*—Well defined; boundary a continuous ring of more or less deformed Pores embedded in soft tissues; contour regular; number per inch of radius (in my specimens), averages 2'9.

*Soft Tissue* of definite arrangement (type of *Acacia* or *Hyariballi* as seen under high magnification). There are fine, thread-like wings to the Pores which sometimes join up to those of adjoining Pores (perhaps at times form concentric lines).

*Pith.*—About  $\frac{1}{8}$  in. diameter; round, woody and the same colour as the wood.

*Radial Section.*—The Pores are rather coarse, usually empty, bleeding occasionally only. The Rays are small, but conspicuous flakes which (on the surface of good sections) are curiously undulating, snake-like, or "wriggling" lines. An uncommon figure, due to the undulating course of the Rays in transverse section.

*Tangential Section* as the Radial, but the Rays need the lens, being on the limit of vision, and are about 1 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 26/2682.

#### 27.—NOT IDENTIFIED.

##### FRONTISPIECE No. 27.

*Alternative Names.*—"Euraballi" (2). "Eueriballi" (17).

*Salient Features.*—A wood superficially resembling Mahogany.

*Physical Characters.*—Weight (so far recorded),  $49\frac{1}{2}$ – $52\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 3, very hard; compare Blackthorn. Smell or taste 0.

*Colour of Heartwood.* Reddish; red-orange; darkens but little on exposure to the air. Surface clean. Sharply defined from the Sapwood. Colour of Sapwood like oatmeal; width  $1\frac{3}{4}$ – $2\frac{1}{2}$  ins.

*Bark.*—About  $\frac{3}{16}$  in. thick, nearly smooth like Beech; brown within, fibrous, gradually becoming granular or crumbling towards the outside, where it is covered by a whitish epidermis. A thin layer of short bast. Surface of log beneath bark, striated or smooth. Bell states that the Bark has an odour of Balsam Capivi. This is not apparent in the specimen. Perhaps it soon passes off.

*Uses, Qualities, etc.*—"Used for furniture. Is readily procurable in logs up to 30 ft. in length, squaring 12-14 inches" (12). Hard to saw; fissile, takes nails badly; planes badly and turns and polishes indifferently. A handsome furniture wood that may be worth attention for export providing that it be not subject to the attacks of worms. My specimen is badly worm-eaten.

*Authorities.*—2. Bell, p. 5. 12. Hawtayne, p. 388. 17. Laslett, p. 412.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—Not much, if at all, darker than the other sections.

*Pores.*—Hardly visible with the naked eye, medium in size, not diminishing towards the close of the season's growth, some variation in no particular order. Evenly distributed, scattered. Single, and in groups of 2-5 Pores between the Rays.

*Rays.*—Visible with the lens; fine, weak, uniform, regular, rather less than the width of a Pore apart, lightly avoiding them.

*Rings.*—Not defined; contour (?) probably regular.

*Soft Tissue* of no definite arrangement.

*Pith.*—(?)

*Radial Section.*—The Pores are rather fine, open scratches; the Rays very inconspicuous and small; the Rings are not indicated.

*Tangential Section* as the Radial, but the Rays are minute, and are about  $\frac{1}{2}$  m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 27/2683.

#### 28.—NOT IDENTIFIED.

*Nat. Ord.*, SAPOTACEÆ. *Native Name*, "FOGLE KOP" (2).

*Salient Features.*—"A heavy, close-grained hardwood of a light brown colour" (2).

*Physical Characters.*—Weight (so far recorded), 49½ lbs. per cubic ft. Hardness, Grade 6, firm; compare Oak. Smell or taste 0. Wood darkens but little on exposure to the air. Surface bright. Probably a Sapwood tree, my specimen is all Sapwood.

*Bark*.—About  $\frac{1}{16}$  in. thick, smooth like Beech; red within, fibrous, full of hard, light-coloured bodies; outer layer brittle. Outside of log beneath Bark, smooth or striated.

*Uses, Qualities, etc.*—"Oars and paddles—readily procurable in logs up to 35 ft. in length, squaring 8-10 ins." (2). "Doors, etc." (20). Fissile, takes nails badly. Works moderately hard, but well, with all tools; polishes indifferently. Of little, if any, export value.

*Authorities*.—2. Bell, p. 5. 12. Hawtayne, p. 386. 17. Laslett, p. 452. 20. McTurk, p. 5.

#### ANATOMICAL CHARACTERS.

These can be seen in the solid wood only when it is kept wetted.

*Transverse Section*.—Rather lighter in shade than the other sections.

*Pores*.—Visible with the lens, small, contents usually black; little variation. Scattered, few, evenly distributed and difficult to see in the solid wood.

*Rays*.—Just visible with the naked eye to good sight; crowded and very numerous; fine, uniform, regular, about the width of a Pore apart; gently undulating, not avoiding the Pores.

*Rings*.—Not defined; boundary doubtful; vague zones of varying depth of colour here and there; contour regular.

*Soft Tissue* of definite arrangement; type of *Lecythis*, No. 45. (cf. Stone, 27a, Pl. IX., fig. 73), which should be compared.

*Pith*.—(?)

*Radial Section*.—The Pores are fine, inconspicuous scratches; the Rays are very inconspicuous, narrow bars; the Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute.

*Type Specimens*.—Authenticated by Bell, No. 28/2684.

### 29.—NECTANDRA RODIOEI, HOOK.

*Nat. Ord.*, LAURINEÆ.

*Synonyms*, N. RODIER. SCHK. OCOTEA RODIEI. MEZ.

*Alternative Names*.—"Bibiru, Black Greenheart" (2); "Geel-heart, in Dutch Guiana; Itauba branca, in the N. Prov., Brazil; Itauba vermelho, in the Amazonas region" (21); "Tugue, Tugul" (A.B.K.); "Rora-ek, in the Accawoi dialect" (22); (?) "Mainop" (61). Not the "Groenhart" described by Martin-Lavigne (20c), p. 147.

*Salient Features*.—A hard, heavy, coarse-grained wood of a more or less pronounced green or greenish-brown colour, with prominent light-green Pores, which give the wood a "cane-like" (17a), appearance in Transverse Section.

*Physical Characters.*—Weight (so far recorded) 58-75 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Smell or taste 0. Surface lustrous and cold to the touch. The Sapwood is ill-defined from the Heartwood, and is about 5 ins. wide.

*Bark.*—About  $\frac{1}{4}$  in. thick, hard and woody, of one layer (plus the epidermis); brown within, covered externally with small warts. Outside of log beneath bark finely striated.

*Uses, Qualities, etc.*—"Ship-building (rated first-class at Lloyd's)—submerged works of all kinds, piles, wharves, etc.—cracks when exposed to the sun" (21). "Resists Limnora terebrans and Tereido, and ranks next to Teak in resisting White Ants" (23a). According to the Kew Bulletin (16b), it is occasionally severely attacked by a worm. "Subject to Star-shake, but is free from shakes down the sides" (17a). Planes well when of good quality; turns hard and badly; polishes indifferently. Fissile, takes nails badly, being so hard. Darkens little, if at all, on exposure to the air. McTurk reported in 1878 that it was getting scarcer, since when, restrictions have been put upon the felling of trees less than 12 ins. in diameter. Frequently confused with the next species, Sipiri.

*Authorities.*—2. Bell, p. 5. 4a. Boulger, p. 440. 10b. Gamble, p. 313. 12. Hawtayne, p. 385. 13. Royle, p. 85. 16a, Kew Bull., 1878, p. 33. 16b, Kew Guide, pp. 36, 38. 17. Laslett, p. 451. 17a. Ibid, p. 270. 21. Miers. 22. McTurk, No. 27. 23a. Oldrieve. 27a, Stone, p. 176, Pl. XI., fig. 99.

#### ANATOMICAL CHARACTERS.

The same as other species of *Nectandra*.

*Transverse Section.*—Much darker than the other sections.

*Pores.*—Appear green, conspicuous, large, practically uniform. Evenly distributed; some single and oval in shape, but mostly subdivided, also compact groups of 3-4; few; 4-13 per square m/m.

*Rays.*—Need the lens. Fine, uniform, equi-distant, less than the width of a Pore apart, yet scarcely avoiding them; gently undulating; long, many 4-6 m/m.

*Rings.*—Rarely, if ever, traceable.

*Soft Tissue.*—Sheathing the Pores, and in very small lines or patches close to them.

*Pith.*—(?)

*Radial Section.*—Much lighter than the Transverse Section. Pores prominent as hoary lines or chambered grooves, containing drops of dark-coloured gum. Rays very inconspicuous, small, dull flakes. Rings rarely traceable. Soft tissue just visible as hoary borders to the Pores.

*Tangential Section* as the Radial, but the Rays need the lens, being minute lines about  $\frac{1}{5}$  m/m. high.

*Type Specimens.*—Bell, No. 29/2685. Laslett's Collection, Nos. 2312 and 2354.

## 30.—NECTANDRA SP.

*Nat. Ord.*, LAURINEÆ.

*Alternative Names.*—"Sipiri" (2); "Sipiera, Yellow Green-heart" (22).

*Salient Features.*—The same as those of Bibiru, but it is generally lighter in colour, and has the aspect of a rather inferior wood. In all other respects the wood is indistinguishable from the previous species.

*Type Specimen.*—Bell, No. 29/2826.

## 31.—TABEBUIA SP.

*Nat. Ord.*, BIGNONIACEÆ.

*Alternative Names.*—"Hackia" (2); "Lignum-vitæ" (4a); "Iron-tree, Iron-wood, Eisenholz of Martinique, West Indisches Eisenholz" (28); "Ijzerhout in Dutch Guiana" (3a). The Hacki mentioned by Miers is evidently not this species.

*Salient Features.*—An extremely hard, heavy, solid, fine-grained wood of an uniform dark brown colour.

*Physical Characters.*—Weight (so far recorded), 81½ lbs. per cubic ft. Hardness, Grade 1, excessively hard; compare Jamaica Lignum-vitæ, but not so flinty. Smell or taste 0.

*Colour* of Heartwood sharply defined from the Sapwood; finely shaded with lighter brown; darkens a little on exposure to the air; surface bright; cold to the touch. Sapwood light brown or brownish-white; width about 1 in.; contour irregular.

*Bark.*— $\frac{1}{8}$ – $\frac{3}{8}$  in. thick, resembling that of Scots Fir, and scales in a similar way. The scales are marked off in section by fine white lines. Surface of log beneath Bark, striated. Some skinny bast.

*Uses, Qualities, etc.*—"Cogs and shafts, but it is almost too hard and heavy for any other purpose" (20). "Average height about 45 feet. It will square about 12 ins. free of Sap—not very readily procurable" (2). Polishes well and makes handsome walking-sticks, which are almost unbreakable. Almost as hard to saw as Lignum-vitæ; takes nails badly, being too hard and fissile; planes hard and very badly; turns hard and badly. A valuable and handsome wood, which should be useful, especially for such purposes where great hardness is essential. Sometimes confused with Hacki and other Ironwoods, and possibly with Lignum-vitæ. From the latter it may easily be distinguished, as Lignum-vitæ has bark that sinks like stone in water, a flinty hardness which will turn the edge of a knife, and a peculiar, sickly, resinous odour when burnt. This is not the same wood as that described under the name of Hackia in 27a., p. 142.

*Authorities.*—2. Bell, p. 5. 3a. Berkhout. 4a. Boulger, p. 425. 12. Hawtayne, p. 386. 17. Laslett, p. 451. 20. McTurk, p. 5. 20b. ditto, p. 188.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—Much darker than the other sections.

*Pores*.—Readily visible to the naked eye on account of their lighter colour; not diminishing towards the close of the season's growth; little variation; evenly distributed, almost crowded; mostly, if not all, single.

*Rays*.—Visible with the lens; very fine, uniform, regular, about the width of a Pore apart; very slightly avoiding the Pores. Mostly, if not all, single.

*Rings*.—Not defined; boundary doubtful. Alternative zones of lighter and darker wood may or may not indicate the season's growth; contour regular.

*Soft Tissue* of no definite arrangement.

*Pith*.—(?)

*Radial Section*.—The Pores are fine, light brown scratches. The Rays are minute brown flakes about as large and as visible as the Pores.

*Tangential Section* as the Radial, but the Rays need the lens, being minute ("stockwerkartige"), and about  $\cdot 2$  m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 31/2687.

## 32.—PROTIUM ARACOUCHINI. MART.

*Nat. Ord.*, BURSERACEÆ.

*Synonyms*, P. ARACOUCHI. MARCH; ICICA ARACOUCHI. AUBL.;

I. ARACOUCHILI. MARCH; I. ARACOUCHI. AUBL.; I. ACUCHINI.

Gmel.; I. HETEROPHYLLA, A.D.C.

*Alternative Names*.—"Hiawá" (2); "Acouchini" (28).

*Salient Features*.—A rather light, rather pale-red, glossy wood.

*Physical Characters*.—Dry-weight (so far recorded),  $49\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 6, firm; compare Beech. Smell when dry 0. Taste astringent. Heartwood darkens but little on exposure to the air. Sapwood the colour of oatmeal; width 2-3 ins., well, but not sharply defined from the Heartwood. Surface glossy.

*Bark*.—About  $\frac{1}{8}$  in. thick, smooth or warty; brown and fibrous within; full of light-coloured bodies. Surface of log beneath bark, smooth.

*Use, Qualities, etc.*—"Liable to rapid decay" (2). "Should be useful for drawers and wardrobe-shelves—50 ft. high, will square 10 ins." (20). Rather hard to saw. Fissile, takes nails badly. Planes fairly well and moderately easily; turns moderately hard but well; polishes indifferently. Of no export value. Sometimes confused with Hiawa-balli or Hiawao-balli, No. 33; and more so with Hiawa, the Incense tree, Protium heptaphyllum.

*Authorities*.—2. Bell, p. 5. 20. McTurk, p. 6.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—Darker in shade than the other sections.

*Pores*.—Visible with the unaided eye as a whole, especially in the Sapwood; small, not diminishing towards the close of the season's growth; little variation except in the groups. Evenly distributed and widely spread; few; mostly single, but a few groups of as many as nine radially or tangentially sub-divided Pores, also.

*Rays*.—Just visible with the unaided eye; more so when moistened. Red, fine, uniform, irregular, rather more than the width of a Pore apart; weak but not avoiding the Pores.

*Rings*.—Apparently defined; boundary (?) a zone of denser wood with fewer Pores, at intervals; contour regular; average 13 per inch of radius in my specimens.

*Soft Tissue* of no definite arrangement.

*Pith*.—(?)

*Radial Section*.—The Pores, when magnified, appear as fine, shining scratches. The Rays are like a fine shading or dotting; very narrow flakes; much more conspicuous in the Sapwood. The Rings are not indicated.

*Tangential Section* as the Radial, but plainer; the Rays need the microscope, being minute and about .25 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 32/2688.

## 33.—CONNARUS GUIANENSIS. LAMB. (probably).

*Nat. Ord.*, CONNARACEÆ.

*Synonyms*, OMPHALOBIUM LAMBERTII, D.C. CONNARUS AFRICANUS, LAM.

*Alternative Names*.—"Hiawao-balli" (2); "Zebra-wood, Hiawa-balli (?)" (4a); "Palmalatto" (17a).

*Salient Features*.—A hard, heavy, compact, fine-grained wood of an uniform mahogany colour and cold to the touch.

*Physical Characters*.—Weight (so far recorded), 62½-66½ lbs. per cubic ft. Hardness, Grade 4, hard. Smell 0. Taste spicy (not strong). Heartwood resembles light-coloured Mahogany. "Reddish-brown" (17). Darkens very much on exposure to the air, becoming a richer colour. Well, but not sharply, defined from the Sapwood. Surface bright. Sapwood oatmeal colour, 1½-1½ ins. wide.

*Bark*.—About ¼ in. thick. Sloughs off in dark, brittle, squarish flakes, which are very sharply marked off in section. Surface of log beneath Bark, wrinkled and striated.

*Uses, Qualities, etc.*—"60 ft., squaring up to 16 ins. Scattered and scarce. Is used for making furniture" (2). "Of great beauty—has a sticky gum similar to Houbooballi" (20)

Very hard to saw. Fissile, takes nails badly. Planes and turns well though hard. Polishes well. A market might be found for this wood as a substitute for the cheap grades of Mahogany. Sometimes confused with Hiawa on account of the similarity in the names.

*Authorities.*—2. Bell, p. 5. 4a. Boulger, pp. 425, 434. 12. Hawtayne, p. 386. 16a. Kew Guide, p. 36. 17. Laslett, p. 451. 17a. ditto, p. 297. 20. McTurk, p. 5.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—Slightly darker than the other sections.

*Pores.*—Visible with the unaided eye, prominent in the Sapwood; not diminishing towards the close of the season's growth; little variation except in the groups. Evenly distributed, scattered over the whole section; few; mostly single, a few pairs and threes. Light coloured in the darker bands, but for the most part inconspicuous. On the contrary, very bold and whitish in the Sapwood.

*Rays.*—Visible with the lens; fine, uniform, regular; equidistant, about the width of a Pore apart, but scarcely avoiding them; rather lighter in shade than the ground.

*Rings.*—Well-defined; boundary a narrow zone of darker wood, poor in Pores; contour regular; averaging 10 per in. of radius in my specimens.

*Soft Tissue* of no definite arrangement; merely very narrow sheaths round the Pores.

*Pith.*—(?)

*Radial Section.*—Lighter in shade than the other sections, lustrous. The Pores are fine scratches; the Rays are small red flakes, prominent when moistened; the Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute red lines on the limit of vision; height about 25 m/m.

*Type Specimens.*—Authenticated by Bell, No. 33/2689.

34.—BYRSONIMA SPICATA. RICH. (not of Poepp).  
(probably).

*Nat. Ord.*, MALPIGHIACEÆ.

*Alternative Names.*—"Hitchia" (2); "Pigeon's Berry, Itchia" (24a); "Surette in Trinidad" (4a); "Moricypre" (16a); "Merisier dore, Bois tan" (266); "Shoemaker's Bark" (16a); "Surette des grands Bois, Cereza del monte o mureché, in Trinidad" (10).

*Salient Features.*—A rather soft, light wood, fine-grained and of an uniform nut-brown colour.

*Physical Characters.*—Weight (so far recorded), 50½ lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell when dry 0. Taste very faintly spicy.



*Colour* of the wood as above; apparently a Sapwood tree, as there is no Heartwood present in our specimen. Darkens but little on exposure to the air. Surface rather dull.

*Bark*.—About  $\frac{1}{4}$  in. thick; smooth; of a terra-cotta colour where broken; full of whitish, rod-like bodies. Exterior of the log beneath the Bark, finely wrinkled.

*Uses, Qualities, etc.*—"Plentiful—30-35 ft. high, squaring 7-9 ins.—a useful timber for house-frames" (2). Saws easily. Fissile, takes nails badly. Planes well and moderately easily; turns hard and badly; polishes badly. Of little value for export. Sometimes confused with Kokeeru, No. 47, on account of similarity of colour.

*Authorities*.—2. Bell, p. 7. 12. Hawtayne, p. 388. 24a. Rodway. 16a. Kew Guide, p. 41.

#### ANATOMICAL CHARACTERS.

The same as those of Kokeeru, No. 47, which should be used for comparison. Only the points in which this wood differs from No. 47 are dealt with below.

*Transverse Section*.—Considerably darker than the other sections.

*Pores*.—Just visible with the naked eye as fine holes, medium in size, diminishing somewhat towards the close of the season's growth, but increasing on an average as the tree ages. Evenly distributed; almost crowded. Single, many pairs and some groups of 3-4. No gum or white contents (except in the Sapwood).

*Rays*.—Visible with the naked eye; rather large, uniform, regular, the width of a large Pore apart, and very slightly avoiding them. Reddish in colour.

*Rings*.—Fairly well defined when seen with the lens; boundary a "zone of contrast" between the small Pores of one season's growth and the larger of the next. Contour regular; average growth, 5.3 per in. of radius in my specimens.

*Soft Tissue* of no definite arrangement.

*Pith*.—(?)

*Radial Section*.—The Pores lack red resin. The Rays have not the resemblance to those of Maple as in No. 47.

*Type Specimens*.—Bell No. 34/2690.

**35.**—NOT IDENTIFIED. Not *Stryphnodendron* as reputed.

*Nat. Ord.*, LEGUMINOSÆ.

*Alternative Names*.—"Hoobooballi" (2); "Cassie" (10).

*Salient Features*.—A light brownish or whitish-brown wood, having blackish streaks here and there.

*Physical Characters*.—Weight (so far recorded), 40½ lbs. per cubic ft., Hardness, Grade 7, soft; compare Pine. Smell or taste 0. Heartwood. The dark lines or streaks are only occasional, and are irregularly concentric in Transverse Section. Well

defined from the Sapwood, but without much contrast; surface brilliantly lustrous. Sapwood much lighter with less red in it; width about 3 ins.

*Bark*.—About  $\frac{1}{8}$  in. thick. "Contains a sticky gum" (20). (This may be found under the bark in a dried condition, in old specimens.) Of two layers; the inner chocolate-colour, rather woody, containing the remains of the Rays; the outer thin, rough and scaling in smallish flakes. In section the scales are clearly marked off. Surface of log beneath Bark, smooth.

*Uses, Qualities, etc.*—"Readily procurable in logs up to 30 ft. in length, squaring 14 ins.—is said to last well under water" (2). "Will outlast almost any other wood at the bottom of a boat" (20). A wood of great beauty that deserves attention on account of its pretty figure and other good qualities. (Specimen was full of minute shakes.) Saws easily. Fissile, takes nails badly. Planes and turns moderately hard but rather badly. Polishes indifferently. Its value for export is doubtful.

*Authorities*.—2. Bell, p. 6. 9. Dalton, p. 210. 12. Hawtayne, p. 386. 17. Laslett, p. 452. 20. McTurk, p. 5.

#### ANATOMICAL CHARACTERS.

The same as those of Trysil, No. 55, with the following differences:—

#### CF. NO. 39 FRONTISPIECE.

*Transverse Section*.—A little darker than the other sections.

*Pores*.—Visible with the unaided eye as holes (to good sight).

*Rays*.—Visible with the lens; about the width of a Pore apart.

*Rings*.—No boundary visible.

*Soft Tissue*.—None in concentric lines.

*Radial Section*.—The Pores exude gum in minute spots. The Rays are very narrow, yet conspicuous flakes.

*Type Specimens*.—Authenticated by Bell, No. 35/2691.

The wood described under this name (Hoobooballi), in 27a, p. 98, is not the same as the present species.

Dalton mentions (p. 201) a wood under the names of "Hoobooballi or Surinam Snake-wood."

### 36.—HUMIRIA sp.

*Nat. Ord.*, HUMIRIACEÆ.

*Alternative Names*.—"Hoorihee" (2); "Hoorihea" (12).

*Salient Features*.—A rather heavy, uniform, nut-brown to chocolate-coloured wood with a white deposit in the Pores, readily visible in all sections.

*Physical Characters*.—Weight (so far recorded), 55½ lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew or Hornbeam. Smell or taste 0. Heartwood darkens but little on exposure to the air; not defined from the Sapwood, as the outer wood is nearly as dark in colour as the inner. Perhaps a Sapwood tree. Surface bright.

*Bark*.—About  $\frac{1}{2}$  in. thick; skinny; smooth; stripping in sheets; crumbling within. The impressions of the ends of the Rays are shown upon the inner surface. Exterior of the log beneath Bark, striated.

*Uses, Qualities, etc.*—"Is readily procurable in sizes up to 30 ft. in length, squaring 12 ins." (2). Takes nails well. Hard to saw. Planes and turns well and easily. Polishes indifferently. Of little value for export.

*Authorities*.—2. Bell, p. 6. 12. Hawtayne, p. 388.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—Darker in shade than the other sections.

*Pores*.—Visible with the naked eye on account of their white contents; small, uniform, not diminishing towards the close of the season's growth, though increasing a little as the tree ages. Evenly distributed, scattered throughout the section, apparently crowded. Single, or a few pairs. White.

*Rays*.—Visible with a powerful lens, very fine indeed; uniform, regular, much less than the width of a Pore apart; weak and wavering, slightly avoiding the Pores.

*Rings*.—Not defined; boundary not indicated at all; the alternations of dark and light zones afford no information; contour (?).

*Soft Tissue* doubtful. (A portion of one specimen seems to indicate the presence of fine concentric lines about twice the width of a Pore apart, but I failed to detect them elsewhere.)

*Pith*.—(?)

*Radial Section*.—The Pores are fine, chalky-white scratches; in places abundant enough to be prominent. The Rays are fine, semi-transparent flakes, just visible in certain lights. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the microscope, being very minute.

*Type Specimen*.—Authenticated by Bell, No. 36/2692.

#### 37.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ. *Native Name*, "HOOROWASSA" (2).

*Salient Features*.—A rather light, soft, lustrous wood, very coarse-grained and of an uniform pinkish colour. Structure readily visible.

*Physical Characters*.—Weight (so far recorded),  $40\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell or taste 0.

*Colour of Heartwood* as above. "Light brown" (2). Darkens but little on exposure to the air. Ill-defined from the Sapwood. Surface brilliant. Colour of Sapwood, oatmeal; width  $1-1\frac{1}{2}$  ins.

**Bark.**— $\frac{1}{4}$ – $\frac{3}{8}$  in. thick, flaking off in irregular scales, very soft and light; laminated and bast-like within. Surface of log beneath **Bark**, scored with shallow grooves.

*Uses, Qualities, etc.*—"Used for the same purposes as **Mora**, No. 65, a wood it much resembles—easily procurable in logs up to 30 ft., squaring 12-14 ins. Large sizes are apt to be unsound" (2). My specimen does not resemble **Mora**. Saws easily; takes nails badly, fissile. Planes and turns very badly though easily; polishes well. Of little, if any, value for export.

*Authorities.*—2. Bell, p. 6. 12. Hawtayne, p. 388. 17. Laslett, p. 452.

#### ANATOMICAL CHARACTERS.

The same as those of **Trysil**, No. 55, with the following differences:—

#### CF. NO. 39 FRONTISPIECE.

*Transverse Section.*—Slightly darker than the other sections.

*Pores.*—Visible with the unaided eye, conspicuous as holes. Here and there a group of many Pores (up to 15), some of which are both radially and tangentially sub-divided into nests, as it were. Chiefly empty; oblique lines doubtful. The linear groups of small, sub-divided Pores, are unusual.

*Soft Tissue.*—Fine concentric lines rare.

*Radial Section.*—The Pores are coarse, empty grooves of the same colour as the ground tissue. The Rays are just visible when moistened.

*Type Specimens.*—Authenticated by Bell, No. 37/2693.

**38.**—NOT IDENTIFIED, but much like **Anona Squamosa**.

*Nat. Ord.*, ANONACEÆ. *Native Name*, "HOWADANNI" (2).

*Salient Features.*—"A close-grained, heavy hardwood of a yellow-brown colour" (2). Very dense, fine-grained, cold to the touch and of uniform colour.

*Physical Characters.*—Weight (so far recorded), 59 lbs. per cubic ft. Hardness, Grade 4, hard; compare **Yew**. Smell 0. Taste astringent. Heartwood darkens somewhat on exposure to the air. Sharply defined from the Sapwood. Surface clean. Sapwood very dark brown, much darker than the Heart; width  $\frac{3}{4}$ –1 in.

*Bark.*—About  $\frac{1}{2}$  in. thick of three layers. The inner brown, striated (or rather showing the ends of the Rays whose imprints are left upon the wood within); the middle containing fine, white, linear bodies; the outer layer is a skinny, brittle epidermis.

*Uses, Qualities, etc.*—"House-building—not plentiful, and only small trees squaring from 5-6 ins. are procurable" (2). Rather hard to saw. Fissile, takes nails badly. Planes and turns very hard and badly, and polishes badly. Of little, if any, export value. Sometimes confused with **Irriariadanni**, No. 42, and with **Manni-balli**, No. 62, on account of the similarity of the colour of

the Sapwood. From both of these the present species may be distinguished with ease by a glance at the Transverse Section.

*Authority*.—2. Bell, p. 6.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—A little lighter in shade than the other sections.

*Pores*.—Just visible with the naked eye from their slightly lighter colour and masses; small, not diminishing towards the close of the season's growth, little variation even in the groups; a few single, mostly in linear, radial groups of 2-8 or more Pores. Evenly distributed, few and widely scattered. In the solid wood, under the lens, the groups look like short, light-coloured lines (or rows of holes).

*Rays*.—Visible with the lens, very fine yet clear; uniform, regular, precisely the width of a Pore apart, but sometimes lightly avoiding them, yet for the most part, parallel with them, the groups of Pores lying between the Rays as though in channels.

*Rings*.—Only apparently defined; boundary doubtful. There are narrow zones of varying depth of colour, but nothing certain can be made out with the lens; contour regular.

*Soft Tissue* of definite arrangement. Exceedingly fine, short bars between Ray and Ray.

*Pith*.—(?)

*Radial Section*.—The Pores are rather fine scratches, which, when magnified, are seen to be frequently in pairs, threes, etc., and to be divided up into very fine chambers. The Rays are just visible. The Rings are not indicated, but the Soft Tissue appears as a series of exceedingly fine lines (microscope). This section under insufficient magnification, simulates the Transverse, because the small-chambered Pores between the lines of Soft Tissue look like Pores between the Rays.

*Tangential Section* as the Radial, without the lines of Soft Tissue. It appears in patches, and is really more abundant though not easily seen. The Pores are always solitary.

*Type Specimens*.—Authenticated by Bell, No. 38/2694.

NOTE.—The leaves resemble those of one or two species of Anona, but the fruits accompanying them suggest Laurineæ.

#### 39.—NOT IDENTIFIED.

*Native Name*, "HYARI-BALLI" (2).

FRONTISPIECE NO. 39.

*Salient Features*.—A light, soft wood of an uniform nut-brown colour having a very narrow Sapwood.

*Physical Characters*.—Weight (so far recorded), 47 $\frac{1}{4}$  lbs. per cubic ft. Hardness, Grade 6, firm; compare Oak. Smell or taste 0.

*Colour of Heartwood* as above; inclined to be streaky; darkens but little on exposure to the air; very sharply defined from the Sapwood. Surface (in Radial Section), lustrous.

*Bark* (?).—Surface of log beneath Bark smooth.

*Uses, Qualities, etc.*—"A good furniture wood. Readily procurable in logs from 30-40 ft., squaring 8-9 ins." (2). Saws easily. Fissile, takes nails badly. Planes and turns badly though easily. A handsome wood, but of doubtful value for export.

*Authority*.—2. Bell, p. 6.

#### ANATOMICAL CHARACTERS.

Similar to those of Hooboballi, No. 35, or Trysil, No. 55, with the following differences:—

#### CF. No. 39 FRONTISPIECE.

*Transverse Section*.—Rather darker and much duller than the other sections.

*Pores*.—Visible with the naked eye on account of their light colour.

*Rays*.—Just visible with the naked eye.

*Rings*.—Well defined; boundary an interruption in the continuity of the growth, accompanied by a darkening of the colour; contour regular; average number per inch of radius 6.5 in my specimens.

*Pith*.—(?)

*Radial Section*.—Glossy. The Pores are rather fine scratches. The Rays are rather conspicuous (though narrow), from their contrast with the glossy ground. The Rings are indicated by the colour-stripes.

*Type Specimens*.—Authenticated by Bell, No. 39/2695.

#### 40.—NOT IDENTIFIED.

*Nat. Ord.*, SAPOTACEÆ. *Native Name*, "HYMARIKUSHI" (2).

#### FRONTISPIECE No. 40.

*Salient Features*.—A very solid, compact, heavy, fine-grained wood, of a reddish or warm nut-brown colour. Structure readily visible.

*Physical Characters*.—Weight (so far recorded), 79 lbs. per cubic ft. Hardness, Grade 3, very hard; compare Blackthorn. Smell when dry, little, if any. Taste 0.

*Colour* darkens considerably on exposure to the air. Surface bright and cold to the touch. Possibly a Sapwood tree; there is no distinction between Sap and Heart in my specimen, which is 6 ins. in diameter, and all dark wood.

*Bark*.—About  $\frac{1}{2}$  in. thick, nearly smooth, scaling in thin flat flakes; red. A little fibrous bast within. Surface of log beneath Bark, finely striated.

*Uses, Qualities, etc.*—"Procurable (not readily), squaring up to 10 ins. by 45 ft. in length" (2). Fissile, takes nails badly. Planes and turns hard but well. Polishes well. Should be useful for purposes similar to those for which Bullet-wood is used. (See No. 12.) Sometimes confused with Bullet-wood, on account of similarity of colour and of structure.

*Authority.*—2. Bell, p. 6.

#### ANATOMICAL CHARACTERS.

Those of Bullet-wood, No. 12, with the following variations. Compare this.

*Transverse Section.*—Similar in shade to the other sections.

*Pores.*—Contrast well with the ground, being much lighter; very plainly visible as branching lines, but not so bold as in No. 68.

*Rays.*—About the width of a Pore apart, rather firm, not avoiding the Pores.

*Rings.*—Well defined; boundary (?) see Soft Tissue; contour regular.

*Soft Tissue* the same as in all Sapotaceous woods.

*Pith.*—(?)

*Radial Section.*—The Pores have little or no red gum. The Rings are not indicated, but the concentric lines of Soft Tissue appear as regular, fine, parallel, continuous lines (like "machine-ruling").

*Type Specimens.*—Authenticated by Bell, No. 40/2696.

#### 41.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ. *Native Name*, "INEERI-BALLI" (2).

*Salient Features.*—A light, rather soft, light reddish-brown, lustrous, coarse-grained wood.

*Physical Characters.*—Weight not recorded. Specimen was too unsound to rely upon. Other details, also, should be read in the light of this. Hardness, Grade 7, soft; compare Pine. Smell little, if any. Taste faint, like Pine.

*Colour* of Heartwood as above, light and dark in bands; darkens but little on exposure to the air. Surface lustrous in patches. Sapwood not defined from Heart, but passing gradually into it; colour as of oatmeal; width about  $3\frac{1}{2}$  ins.

*Bark.*— $\frac{1}{8}$ – $\frac{1}{4}$  in. thick, reddish; fibrous within, smooth externally with a granular layer between. Surface of log beneath Bark, smooth.

*Uses, Qualities, etc.*—"Plentiful—logs up to 40 ft., squaring 7-9 ins.—house-framing—unusually lasting" (2). Saws easily; takes nails fairly well; planes and turns easily but badly. Unsuitable for polishing. Of no export value.

*Authority.*—2. Bell, p. 6.

## ANATOMICAL CHARACTERS.

As Arisourou, No. 3, which should be compared. Differences as follows:—

*Pores*.—Visible with the naked eye, but scarcely conspicuous; apparently diminishing towards the close of the season's growth; considerable variation; often radially sub-divided. The oblique lines of Pores are not often continuous for more than short lengths (10-15 Pores), and these only in the dense wood; widely separated elsewhere, yet clearly indicating oblique lines.

*Rays*.—Less than the width of a large Pore apart.

*Rings*.—Apparently defined; boundary doubtful; in any case the narrow, dense zones, have nothing to do with the close of the season's growth, as the continuous oblique lines of Pores cross right over them. Contour regular.

*Type Specimens*.—Authenticated by Bell, No. 41/2697.

## 42.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ.

*Alternative Names*.—"Irriariadanni" (2); "Irriariadan" (12).

*Salient Features*.—A rather heavy, light brown wood, with coarse, open grain, and of a red colour with conspicuous lines of Soft Tissue. Sapwood dark.

*Physical Characters*.—Weight (so far recorded), 49 $\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 4, hard; compare Hornbeam. Smell 0. Taste little, if any.

*Colour* of Heartwood, sharply defined from Sapwood; light brown to dark brown; biscuit colour; with fine red lines (the Pores); much lighter than the Sapwood, which is unusual; darkens but little on exposure to the air, but the Pores bleed, thus becoming prominent in vertical sections. Surface bright in Radial section but dull in the others. Sapwood very dark grey, an unusual colour, possibly due to decay; width about 1 $\frac{3}{4}$  ins.

*Bark*.—About  $\frac{1}{4}$  in. thick, brown, lightly fissured. A thin, brittle skin outside; hard, woody, uniform in structure, but the inner is grey, the outer light brown. Surface of log beneath bark shows the oblique course of the grain, and has a matt appearance where the Rays protrude from the surface (lens required).

*Uses, Qualities, etc.*—"Readily procurable in logs up to 50 ft. in length, squaring 12 ins. Most durable—superior to Greenheart—produces a sticky, yellow gum" (20). Saws moderately hard. Fissile, takes nails badly. Planes and turns moderately hard and badly; polishes indifferently. Unless proved to be suitable for purposes for which Greenheart is used, this wood has



no value for export. Sometimes confused with *Manniballi*, to which it has a strong resemblance.

*Authorities*.—2. Bell, p. 6. 12. Hawtayne, p. 385. 20. McTurk, p. 4.

#### ANATOMICAL CHARACTERS.

Somewhat similar to those of *Pakoorie*, No. 70; *Manniballi*, No. 62. (See also *Washiba*, Stone, 27a., Pl. VII., fig. 57.)

*Transverse Section*.—Slightly darker than the other sections.

*Pores*.—Readily visible with the naked eye as holes; large, not diminishing towards the close of the season's growth, but becoming gradually larger as the tree ages; little variation except in the groups; evenly distributed, isolated or isolated groups of 2-4, or rarely 7, Pores; few, widely scattered, can be counted without the aid of the lens in old wood; mostly containing gum and sparkling here and there.

*Rays*.—Just visible with the naked eye when moistened; very fine, uniform, regular, weak and thread-like; less than the width of a Pore apart; slightly avoiding the Pores; of the same colour as the Soft Tissue.

*Rings*.—Well defined; boundary a fine line accompanied by an interruption in the succession of the zones of Soft Tissue, contour regular, averaging 6 per inch of radius in my specimens.

*Soft Tissue* of definite arrangement; type of *Washiba* or *Manniballi*, No. 62, but much coarser and bolder, in broad, light-coloured concentric, closely-packed, continuous zones imbedding the Pores. In young wood they are broken and then resemble those of *Purpleheart*.

*Pith*.—About  $\frac{1}{8}$  in. diameter, brown, woody.

*Radial Section*.—Not as light as the *Tangential Section*, but a little lighter than the *Transverse*. The Pores are coarse, red grooves having chambers that are visible without the aid of the lens. The Rays are faint semi-transparent lines. The Rings are scarcely indicated.

*Tangential Section* as the *Radial*, but a little lighter as the Soft tissue is more abundantly exposed in this section. The Rays need the microscope, being minute and about 25 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 42/2698.

#### 43.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ.

*Alternative Names*.—"Itikabouraballi" (2); "Itikaboura" (12); "Bois de lettres; Tigerwood" (28); "Hitriribouraballi" (9).

*Salient Features*.—A rich, nut-brown, hard, heavy wood of an uniform colour. Lustrous in *Radial Section*.

*Physical Characters.*—Weight (so far recorded),  $50\frac{1}{2}$  lbs. per cubic ft. (This specimen was, however, chiefly Sapwood, hence the figure is too low). Hardness, Grade 4, hard. Smell 0. Taste slightly resinous.

*Colour* of Heartwood as above; "almost black" (20); darkens but little on exposure to the air; surface brilliant. Sapwood, dirty yellow or dirty oatmeal-colour, sharply defined from the Heartwood; width  $2\frac{1}{2}$ - $3\frac{1}{4}$  ins.

*Bark.*—About  $\frac{3}{16}$  in. thick, light brown, scaling in thin, brittle flakes exposing the still lighter inner layer. In section the latter is stratified, as are also the scales, but the black lines of the inner layer do not appear in them. Surface of log beneath Bark finely ridged.

*Uses, Qualities, etc.*—"Not common and the larger sizes are apt to be faulty" (2). "Can be had to square up to 15 ins. free of Sap—furniture, walking-sticks" (20). Rather hard to saw; takes nails badly, fissile; planes well though hard; turns well; polishes indifferently. A handsome wood resembling Walnut. It has a satiny lustre or "fire." Logs of good quality may find a market in England as a substitute for Walnut.

*Authorities.*—2. Bell, p. 6. 4a. Boulger, p. 423. 9. Dalton, p. 211. 12. Hawtayne, pp. 384, 387. 17. Laslett, p. 421. 18a. Lindley, p. 1,151. 20. McTurk, p. 3. 28. Wiesner, p. 89.

#### ANATOMICAL CHARACTERS.

Those of Wamara, No. 92, with which this should be compared, noting the following differences:—

*Transverse Section:*—

*Pores.*—Prominent and striking in the outer, younger wood; not diminishing towards the close of the season's growth, but increasing in size remarkably as the tree ages; considerable variation otherwise, in no particular order. Evenly distributed, scattered widely; contents light coloured. This is the most remarkable instance that has ever come under my notice, of the immense difference between the size of the Pores in the old and in the new wood.

*Soft Tissue* of definite arrangement; type of Wamara and Pterocarpus (cf. Stone 27a., Pl. V., fig. 41). Width of concentric lines approximately that of the space between the Rays.

*Radial Section.*—Lighter in shade than the Transverse, but darker than the Tangential. The Pores are prominent grooves which show up against the lustrous ground. The Soft Tissue appears as a very fine, regular, vertical ruling, visible with the lens, although too fine to see with the unaided eye; it is to this that the satiny gloss of the wood is due. The Rays need the lens and are too minute to affect the appearance of the wood.

*Type Specimen.*—Authenticated by Bell, No. 43/2699.

- 44.—NOT IDENTIFIED, but from comparison with Berkhout's Specimen, I think it is *GOUPIA GLABRA*. AUBL.

*Nat. Ord.*, CELASTRINÆ.

The same wood as that described by Martin-Lavigne (20c), p. 91, but he shows no proof that it is correctly named.

*Alternative Names*.—"Kabukalli" (2); "Koepie" (3); "Copie" (10b); "Kopie" (4a). (?) Coupi, Couepi. Not "Kwepi" (20c).

*Salient Features*.—A wood with a revolting smell, brown, reddish-brown or grey in colour, heavy and hard.

*Physical Characters*.—Weight (so far recorded),  $52\frac{3}{4}$ - $56\frac{1}{2}$  lbs. per cubic ft. Hardness, Grade 3, very hard. Smell abominable; compare Mark Twain's description of Limburger cheese. Taste very offensive, though not cheese-like. Heartwood darkens but little on exposure to the air; surface dull. Sapwood, greyish-white to yellowish-white; width (?).

*Bark*.—About  $\frac{1}{8}$  in. thick, smooth or lightly wrinkled, crumbling. Surface of log beneath Bark, smooth.

*Uses, Qualities, etc.*—"Planking in punt bottoms, railway-sleepers. Readily procurable in logs up to 60 ft. in length, and squaring from 12-16 ins. The Indians prefer canoes made of this wood to any other, as they will not split from exposure to the sun" (2). Saws easily though hard; fissile, takes nails badly; planes well; turns hard and badly; polishes badly. Specimen is of inferior quality. Better grades are difficult to split, hard to saw and extremely difficult to plane to a smooth surface. It may be of use for export for sleepers, paving blocks and similar purposes. Rarely confused with any other wood.

*Authorities*.—2. Bell, p. 6. 3. Berkhout, p. 25. 4a. Boulger, p. 424. 12. Hawtayne, p. 384. 17. Laslett, p. 452. Martin-Lavigne (20c), p. 120.

#### ANATOMICAL CHARACTERS.

*Transverse Section*:—

*Pores*.—Visible to the unaided eye as pin-holes; some variation in size and increasing rapidly and largely as the tree ages. Evenly distributed, scattered over the whole section. (They appear to increase in size towards the close of the season's growth independently of the general increase.)

*Rays*.—Visible with the lens, very fine, uniform, regular, much less than the width of a Pore apart, crowded, widely avoiding the Pores.

*Rings*.—Ill-defined; boundary doubtful. There is a change from time to time, but this scarcely seems to indicate the close of the season's growth; contour regular.

*Soft Tissue* sheathing the Pores. In one specimen I have seen indications of wings to the Pores as though they were remains of concentric lines connecting them.

*Radial Section*.—The Pores are medium, coarse scratches, sometimes containing beads of gum. The Rays are fine, inconspicuous flakes.

*Tangential Section* as the Radial, but the Rays need the lens, being minute.

*Type Specimens*.—Authenticated by Bell, No. 44/2700 (all Sapwood). Imp. Inst., No. 0065. Berkhout, No. 2626.

NOTE.—The leaves resemble those of *Goupia glabra*, but the fruit to this number is that of a *Caryocar*.

#### 45.—LECYTHIS (CHYTROMA) CORRUGATA. POIT.

*Nat. Ord.*, MYRTACEÆ.

*Synonym*, ESCHWEILERIA CORRUGATA. MIERS.

This wood is indistinguishable from that described in 27a., p. 135, under the name of *Lecythis Ollaria* Linn (not DaGama, Spruce or Vell). As Mr. Bell uses the same name for this number, and as specimens which were sent to the Colonial and Indian Exhibition similarly labelled are the same wood, I think it is not unlikely that it has been passing under the wrong systematic name, which authors have copied one from another, without verification. Hence, I think that the various references given below probably apply to *L. Corrugata*, and not, as the authors state, to *L. Ollaria*. I give them with reservations.

*Alternative Names associated with L. Ollaria*.—"Kakaralli, Olla de Mono" (4a); "Manbarklak" (3a) (not Oemanbarklak); "Cockeralli" (9); "White Kakeralli" (12); "Monkey-pot, Sapucaia-nut (Fowl-nut) in British Guiana" (22); "Sapucaiapilao in the Province of Rio de Janeiro" (21); "Barklak in Dutch Guiana" (4a). Native name applied to this number by Bell, "Kakeralli." Not the "Manbarklak" described by Martin-Lavigne (20c), p. 130, under the name of *L. longipes*. Miers.

*Salient Characters*.—A reddish or greyish-brown wood, cold and smooth to the touch, heavy and hard, fine-grained and dense.

*Physical Characters*.—Recorded dry-weight, 53½-62 lbs. per cubic ft. Hardness, Grade 2, compare Boxwood, extremely hard; "becomes hard with age" (3). Smell, peculiar when worked. Taste 0.

*Colour* of Sapwood light-brown, well, but not sharply, defined from the Heartwood; width about 1½ ins. Surface glossy.

*Bark*.—"Light grey" (3); bast long and stringy like that of the Lime-tree. Exterior surface of log, smooth; fluted here and there.

*Uses, Qualities, etc.*—"House-framing, wharves, sluices—said to resist Teredo and Barnacles—more durable than Greenheart" (22). "Berkhout says that recent researches in Holland point to the fact that this wood does not resist Teredo" (3). He does not,

however, accept these results as conclusive. "Fairly plentiful—35 to 40 ft., squaring 12 ins." (2). Not ornamental; very hard to saw and plane. Fissile, takes nails badly. Turns and polishes indifferently, except in the best qualities. Cleaves straight; exceedingly strong and hard to break transversely. One of the strongest woods that I have ever seen. Fractures like cane, with a very long, fibrous, stringy, almost "green-stick" fracture. Darkens little, if at all, upon exposure to the air.

*Authorities.*—20. McTurk, No. 62. 26a. J. Smith, p. 368. 5b. J. Coolins. 21. Miers. 43. Boulger, p. 430. 3. Berkhout, p. 28. 3a. ditto, p. 6. 9. Dalton, p. 211. 12. Hawtayne, p. 387. 17. Laslett, p. 451. 2. Bell, p. 10. 27a. Stone, p. 135. (Pl. IX., fig. 73.)

Easily confused with Wadaduri, No. 90, and Kautaballi, No. 49, from both of which it is indistinguishable by means of description of the structure. The chief point of difference to the former is the colour of the wood. It is very difficult to distinguish it at all from Kautaballi.

The ANATOMICAL CHARACTERS for all three species are as follows:—

*Transverse Section:*—

*Pores.*—Prominent, rather large; little variation except within the groups (rather smaller in Kakaralli than in Wadaduri); evenly distributed in irregular sub-divided groups of 2-12 Pores (usually over 10); groups oddly shaped like bubbles in froth, apparently connected radially at times; oval; some red contents; appearing light coloured.

*Rays.*—Visible with the lens, fine, uniform, somewhat irregularly spaced, running round the larger Pore-groups; very irregularly bent; waved; less than the width of a Pore apart; lighter in colour than the ground and much denser.

*Rings* doubtful. The vague zones here and there, where the lines of Soft Tissue are more or less crowded, may indicate the limits of the season's growth.

*Soft Tissue.*—Very plentiful and the great feature; in innumerable, concentric, undulating lines, 7-11 per m/m.; of coarse cells; the same colour as the Rays, and making a fairly regular network with them; contour regularly crenate.

*Pith.*—(?)

*Radial Section.*—Pores not prominent. Rays are minute crystalline flakes. The Soft Tissue appears in many fine, parallel lines; inconspicuous, but a feature.

*Tangential Section* as the Radial, but the Rays are minute and need the lens.

*Type Specimens.*—Authenticated by Bell, No. 45/2701. Imp. Inst., No. 0180. Berkhout, No. 2633.

NOTE.—The leaves attached to the fruit specimen are not identical with those of the same number in the collection of

leaves. They both appear to be species of *Chytroma* (*Lecythis*). For the present purpose we have assumed that the fruit specimen is from the tree which yielded the specimen of wood.

#### 46.—NOT IDENTIFIED.

*Alternative Names.*—"Kakataraballi" (2); (?) "Kookerite Balli" (12).

*Salient Features.*—A light, soft white wood with prominent rays.

*Physical Characters.*—Weight (so far recorded),  $41\frac{1}{4}$  lbs. per cubic ft. Hardness, Grade 8, very soft; compare White Pine. Smell 0. Taste little, if any. Heartwood darkens but little on exposure. Surface scarcely bright. Apparently a Sapwood tree; my specimen, which is from a tree 10 ins. in diameter, is all Sapwood. Colour, dirty white; whitish yellow.

*Bark.*— $\frac{1}{16}$ – $\frac{1}{8}$  in. thick; smooth and skinny outside, crumbling within. Surface of log under bark, nearly smooth or finely striated.

*Uses, Qualities, etc.*—"Used for table drawers and takes polish well. Readily procurable in logs up to 30 ft. in length, squaring 12 ins." (2). Saws easily; takes nails well; planes and turns easily but badly. Not suitable for polishing. The inferior quality of my specimen may account for the difference of opinion.

*Authorities.*—2. Bell, p. 6. 12. Hawtayne, pp. 387-8.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—Similar in shade to the other sections.

*Pores.*—Visible with the naked eye, small, apparently diminishing regularly towards the close of the season's growth. Very few; indeed, remarkably so. Evenly distributed between the Rays; mostly single, with a few pairs radially sub-divided.

*Rays.*—Visible with the naked eye; prominent, large, uniform, irregular, the thinner portions or ends about the width of a Pore apart; the middles widely separated, strong, direct, not avoiding the Pores; tapering considerably.

*Rings.*—Not defined; boundary doubtful; contour regular.

*Soft Tissue.*—Of no definite arrangement; not visible with the lens.

*Pith.*—(?)

*Radial Section.*—The Pores are fine, almost imperceptible scratches. The Rays are broad, yellowish-white flakes, large but not prominent, as they lack contrast.

*Tangential Section* as the Radial, but without the silver-grain. The Rays do not require the lens, as notwithstanding their minuteness they are yet visible to good sight.

*Type Specimens.*—Authenticated by Bell, No. 46/2702.

## 47.—NOT IDENTIFIED.

*Native Name*, "Kokeeru" (2).

*Salient Features*.—A hard, heavy, compact, fine-grained, nut-brown wood of uniform colour.

*Physical Characters*.—Weight (so far recorded), 56 lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew. Smell or taste 0.

*Colour* of Heartwood darkens but little on exposure to the air; not defined from the Sapwood. Surface bright. Perhaps a Sapwood tree, as my specimen (though hardly appearing quite normal), is the same dark colour throughout.

*Bark* (?).—Surface of log beneath bark, wrinkled.

*Uses, Qualities, etc.*—"Small sizes\* very crooked—boat-crooks and wheel felloes" (2). Very hard to saw. Fissile, takes nails badly; planes and turns hard and indifferently. Of little, if any, export value. Sometimes confused with *Hitchia*, No. 34, from similarity in colour.

*Authority*.—2. Bell, p. 7.

## ANATOMICAL CHARACTERS.

The same as those of *Hitchia*, No. 34.

*Transverse Section*.—Much darker in shade than the other sections.

*Pores*.—Just visible with the naked eye, especially when they have white contents; not diminishing regularly towards the close of the season's growth; considerable variation in no particular order. Evenly distributed; widely scattered over the whole section. Mostly single, perhaps all; the larger Pores empty, or a few containing chalky matter; the smaller filled with red resin or gum.

*Rays*.—Visible with the lens; uniform; irregular, more than the width of a Pore apart; red.

*Rings*.—Not defined; boundary and contour doubtful.

*Soft Tissue* of no definite arrangement; not visible with lens.

*Pith*.—(?)

*Radial Section*.—The Pores are fine scratches containing minute drops of red gum. The Rays are very shallow, but owing to their red colour, appear prominent.

*Tangential Section* as the Radial, but lacking the "silver-grain." The Rays need the microscope, being minute and about .25 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 47/2703.

## 48.—ANDIRA SP.

*Nat. Ord.*, LEGUMINOSÆ. *Native Name*, "KAMARAKATA" (2).

*Salient Features*.—A light, rather soft, yellowish-brownish wood, of uniform colour. Structure in Transverse Section very prominent. The dark brown wood having a bitter taste and resembling *Hackia*, described by McTurk (20), under the above name, is obviously a different wood.

*Physical Characters.*—Weight (so far recorded),  $47\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell or taste 0.

*Colour* of Heartwood as above; it has a hoary appearance; darkens a little on exposure to the air; well, but not sharply, defined from the Sapwood. Surface bright. Sapwood, the colour of oatmeal; width about  $2\frac{1}{4}$  ins.

*Bark.*—About  $\frac{1}{4}$  in. thick, lightly fissured, wrinkled, very hard and gritty. Surface of log under bark, striated or smooth.

*Uses, Qualities, etc.*—"Very scarce—same qualities as Kumara, No. 56—mill-beds, naves of cartwheels" (2). Saws easily. Fissile, takes nails badly; planes and turns moderately easily but indifferently; polishes badly. Of doubtful value for export. (Specimen was worm-eaten and unsound.)

*Authority.*—2. Bell, p. 7. 20. McTurk, p. 5.

#### ANATOMICAL CHARACTERS.

The same as those of Barrakarra, No. 9, with the following differences:—

*Transverse Section:*—

*Pores.*—Easily visible to the naked eye, large, some variation; mostly single, but there are also groups of 2-4.

*Rays.*—Just visible with the naked eye.

*Soft Tissue* of definite arrangement; type of Andira (27a., Pl. VI., fig. 50), and Barrakarra. It occupies about half of the whole wood.

*Radial Section.*—The Rays are inconspicuous yet readily visible.

*Type Specimens.*—Authenticated by Bell, No. 48/2704.

#### 49.—LICANIA SP.

*Nat. Ord.*, ROSACEÆ. (Possibly *L. triandra* or *mollis*.)

*Native Name*, "KAUTABALLI" (2).

*Salient Features.*—A very hard, heavy, solid wood of a dark, brownish colour, resembling Kakeralli, No. 45.

*Physical Characters.*—Weight (so far recorded),  $76\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Smell unpleasant when sawn. Taste 0.

*Colour* inclined to be stripy; darkens a little on exposure to the air. Possibly a Sapwood tree, the outer wood being but a little lighter than the inner.

*Bark.*— $\frac{1}{4}$ - $\frac{1}{2}$  in. thick, smooth or warty, hard, woody; scaling; brown within, having a thin, fibrous layer. The outer scaling layer is very hard and brittle. Lenticels large. Surface of log beneath bark, smooth or striated.

*Uses, Qualities, etc.*—"Readily procurable in logs up to 30-40 ft. in length, squaring 10 ins." (2). "There are two or three



varieties of this tree, distinguishable by the size of their leaves; useful for house-framing" (20). Very hard to saw. Fissile, takes nails badly; planes and turns hard and badly; polishes indifferently. Of doubtful value for export, but may be useful where hardness is an important point. (Specimen was shattered, but I believe that good samples will be found to have great resistance to transverse strain.) Sometimes confused with Kakeralli, No. 45. It is difficult to distinguish them when hand specimens of the wood only, are present.

*Authorities.*—2. Bell, p. 7. 12. Hawtayne, p. 385. 17. Laslett, p. 452. 20. McTurk, p. 4.

#### ANATOMICAL CHARACTERS.

Resembling those of Kakeralli and other species of *Lecythis* (cf. Stone 27a., Pl. IX., fig. 73). The following differences may be constant:—

*Transverse Section.*—Darker in shade than the other sections.

*Pores.*—Visible with the unaided eye, prominent; considerable variation in no particular order; mostly single, a few pairs and threes; groups larger than three rare, if any.

*Rays.*—Scarcely avoid the Pores.

*Soft Tissue* of definite arrangement; type of *Lecythis*, but altogether lacking in the exquisite regularity of that genus; uneven in spacing, in size and in contour; yet roughly crenate, undulating in short waves, like scallops.

*Pith.*—(?)

*Radial Section.*—The Pores are almost prominent, empty grooves.

*Tangential Section* as the Radial, but the Rays need the microscope, and will then show the red drops of gum, and also the remarkably large cells of the Rays.

*Type Specimens.*—Authenticated by Bell, No. 49/2705.

#### 50.—NECTANDRA SP.

*Nat. Ord.*, LAURINEÆ.

By comparison with Berkhout's specimen of "Pisi," I think that this species is near *N. Pisi*. Not the wood described by Martin-Lavigne (20c), p. 66, as *N. Pisi*.

*Alternative Names.*—"Keritee, Kretty" (2); "Kretti, Bastard Silverballi" (9); "Kerati, Bucksnuff". (J. A.).

*Physical Characters.*—Weight (so far recorded), 27-32 lbs. per cubic ft. Hardness, Grade 5, rather hard; compare Ash, Elm. Smell and taste resembling those of cigar box Cedar.

*Salient Features.*—A brown, moderately coarse-grained, lustrous wood; not cold to the touch. Sapwood greyish-white, gradually merging into the darker Heartwood; width 1 to 5 ins. (See note.) Darkens considerably on exposure to the air.

*Bark.*— $\frac{1}{2}$ - $\frac{1}{4}$  in. thick, resembling that of Sycamore, but sometimes reddish in colour. Of three layers, the innermost dark, the

middle fibrous layer lighter, and the dark epidermis. Surface of log beneath Bark finely striated.

*Uses, Qualities, etc.*—"The upper planking of boats, partitions, etc., can be obtained in logs 80 ft. by 20 ins. free of Sapwood" (22). Easy to work. Fissile, takes nails badly; planes and turns easily and well; polishes indifferently. Not an ornamental wood, and of doubtful value for export.

*Authorities.*—(J. A.) Aiken, MS. 2. Bell, p. 7. 9. Dalton, p. 211. 12. Hawtayne, p. 387. 17. Laslett, p. 452. 22. McTurk, p. 6. 27a., Stone, p. 179, Pl. XII., fig. 101, 78.

#### ANATOMICAL CHARACTERS.

Similar to those of Brown Cirouaballi, which should be compared. See No. 17 and Pl. No. 89, Frontispiece.

*Transverse Section*:—

*Pores.*—Readily visible with the unaided eye on account of their large size; fairly uniform; evenly distributed; some single, many sub-divided into groups of as many as 7 Pores; few; oval; sometimes glistening.

*Radial Section.*—Lighter in shade than the Transverse. Pores rather prominent, though colourless; coarsely chambered, containing drops of gum that look like silver beads. Rays clearly visible, though not at all conspicuous, bright, reddish flakes.

*Pith.*—About  $\frac{1}{4}$  in. in diameter, light brown.

*Type Specimens* authenticated by Bell, No. 50/2706. Imp. Inst., No. 0234. Rev. J. Aiken, No. A15/3033. No. 2706, although from a log 10 ins. in diameter, is all Sapwood.

#### 51.—NOT IDENTIFIED.

*Native Name*, "KILLIKOWA" (2).

*Salient Features.*—"A light, fairly cross-grained, red-brown wood" (2). Surface like watered silk.

*Physical Characters.*—Weight (so far recorded),  $44\frac{1}{2}$  lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell or taste 0.

*Colour* of the Heartwood, as above; uniform except for the Pores which are darker. Darkens but little on exposure to the air. Not defined from the Sapwood. Surface brilliantly lustrous. A Sapwood tree, judging from my specimen, which is about 9 ins. in diameter.

*Bark* about  $\frac{3}{16}$  in. thick, deep red, lightly fissured, fibrous. When cut across, the fibres glisten. Surface of log beneath Bark finely striated and frosted with minute drops of gum (lens).

*Uses, Qualities, etc.*—"A furniture wood. Is readily procurable in logs up to 36 ft., squaring 8-10 ins." (2). Saws easily. Fissile, takes nails badly; planes and turns easily but badly; polishes indifferently. A pretty wood when cut on the quarter, on account of its satiny lustre and figure. It may find a use as a substitute for Maple.

*Authority.*—2. Bell, p. 7.

## ANATOMICAL CHARACTERS.

Similar to those of the Cedrelas (Stone 27a. Pl. III. fig. 23), and our No. 14 Frontispiece.

*Transverse Section*.—Considerably darker in shade than the other sections.

*Pores*.—Just visible with the naked eye as fine perforations; scarcely diminishing towards the close of the season's growth; if anything, the converse is the case. Little variation. Evenly distributed, widely scattered; very few; single or in radial groups of 2-4.

*Rays*.—Visible with the naked eye (when moistened); irregularly spaced, mostly less than the width of a Pore apart and avoiding them.

*Rings*.—Well defined; boundary in a fine line of Soft Tissue, readily visible to the naked eye; contour regular. Number per inch of radius averaging 11'8. (In my specimen one Ring is over  $\frac{1}{2}$  in. wide).

*Soft Tissue* of definite arrangement; type of Cedrela and Mahogany, i.e., the fine, light coloured boundary line (? encircling the Pores also).

*Pith*.—(?)

*Radial Section*.—The Pores are prominent, though small, dark grooves. The Rays are narrow, brown lines which show up conspicuously against the brilliant ground. The Rings are scarcely visible.

*Tangential Section* as the Radial, but the Rays are minute, brown lines which give the section a sort of "half-tone" appearance; they are about '2 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 51/2707.

## 52.—NOT IDENTIFIED.

*Native Name*, "KOKATARRA" (2).

*Salient Features*.—A very soft, light, white wood with a yellowish silver-grain.

*Physical Characters*.—Weight (so far recorded),  $38\frac{1}{2}$  lbs. per cubic ft. Hardness, Grade 8, very soft; compare White Pine. Smell 0. Taste astringent. Apparently a Sapwood tree. My specimen which is from a tree 8 ins. in diameter is all Sapwood. Darkens a little on exposure to the air. Surface lustrous in Radial section.

*Bark*.—About  $\frac{1}{8}$  in. thick, brown, of one layer, crumbling. Pitted externally (with wart-like lenticels). Surface of log beneath bark, smooth or striated.

*Uses, Qualities, etc.*—"Very small sizes—short—wood not used" (2). Saws easily. Fissile, takes nails badly; planes and turns easily and moderately well; polishes indifferently. Of no export value.

*Authorities*.—2. Bell, p. 7. 12. Hawtayne, p. 387.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—A trifle darker than the other sections.

*Pores*.—Scarcely visible with the naked eye, lacking size and contrast; not diminishing towards the close of the season's growth, some variation in no particular order. Evenly distributed, very scarce and widely separated; single or in groups of 2-3 Pores. The pairs are sub-divided Radially, as well as Tangentially. The small number of Pores is an unusual feature.

*Rays*.—Just visible with the naked eye, lacking contrast, though not very small; of one or (?) two kinds; irregular. The smaller edges of the larger Rays the width of a Pore apart, the larger (or middles) 2-8 Pore-widths apart. Much denser than the ground tissue, which is very coarse and lighter in colour.

*Rings*.—Not defined; boundary doubtful.

*Soft Tissue*.—Of no definite arrangement, but the whole of the wood is soft and "coarse-celled."

*Radial Section*.—Rather lighter in shade than the other sections. The Pores are fine scratches. The Rays are inconspicuous, yellowish flakes. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute and almost imperceptible on account of the lack of contrast. Height about 2 m/m.

*Type Specimens*.—Authenticated by Bell, No. 32/2708.

## 53.—HEVEA. SP. (Probably).

*Nat. Ord.*, EUPHORBIACEÆ. *Native Name*, "KOOLABALLI" (2).

*Salient Features*.—"A coarse-grained wood of a dirty drab colour" (2).

*Physical Characters*.—Weight (so far recorded) 37 lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. It has rather curious odour when sawn. Taste 0. Apparently a Sapwood tree. My specimen from a tree 10 ins. in diameter is all Sapwood. Darkens little, if at all, on exposure to the air. Surface lustrous.

*Bark*.—About  $\frac{1}{4}$  in. thick, smooth or warty; firm and woody outside; fibrous and bristly within. Surface of log beneath Bark, smooth or striated.

*Uses, Qualities, etc.*—"Common, but of little value" (2). Specimen was unsound, hence the tests are of no use. The wood is not suitable for export, and of little value in the Colony.

*Authorities*.—2. Bell, p. 7. 12. Hawtayne, p. 387. 17. Laslett, p. 452.

## ANATOMICAL CHARACTERS.

Those of Eda-balli, No. 25, and Kurahara, No. 57, and No. 57 Frontispiece, with which latter this should be compared. It displays the following differences:—

*Transverse Section*.—A trifle darker than the other sections.

*Pores*.—Just visible with the naked eye as holes; considerable variation in size in no particular order.

*Rays*.—Visible with the lens, unusually numerous and close together, much less than the width of a Pore apart, sometimes as many as four in the space equal to the width of the larger Pores, and often interrupted by them.

*Rings*.—*Boundary* (?) a narrow zone of denser wood here and there; contour regular.

*Soft Tissue* of definite arrangement; type of Bullet-wood (27a, Pl. X., fig. 83). A series of extremely fine, close, numerous, concentric lines of slightly undulating contour; rather narrower than the Rays and making a network with them.

*Radial Section*.—Brilliant. The Pores are exposed in pairs and threes, and hence the grain appears coarse; darker than the wood. The Rays are fine, lustrous, crystalline, very narrow bars. The Rings are not indicated. The Soft Tissue appears as exceedingly fine striations.

*Tangential Section* as the Radial, but not brilliant; hardly lustrous.

*Type Specimens*.—Authenticated by Bell, No. 53/2709.

#### 54.—NOT IDENTIFIED.

*Native Name*, "KOOLISHIRI" (2).

*Salient Features*.—A wood having a superficial resemblance to Mahogany.

*Physical Characters*.—Weight (so far recorded), 53 lbs. per cubic ft. Hardness, Grade 6, firm; compare Oak or Teak. Smell 0. Taste astringent.

*Colour* of Heartwood, pinkish to reddish brown; darkens but little on exposure to the air. Colour of Sapwood, lighter; width about  $\frac{1}{2}$  in.

*Bark*.—About  $\frac{1}{4}$ – $\frac{3}{8}$  in. thick, smooth or wrinkled, very hard and woody, scored on the inner surface with spindle-shaped fissures. Crimson in Transverse Section when moistened; contains hard, white bodies. Surface of log beneath Bark deeply striated or grooved.

*Uses, Qualities, etc.*—"A furniture wood. Readily procurable in logs up to 20 ft. in length, squaring 6-9 ins." (2). Saws easily; takes nails fairly well; planes and turns moderately easily but very badly. Polishes well. Of doubtful export value. It may compete with common "Baywood." Sometimes confused with Mahogany on account of the similarity in colour.

*Authority*.—2. Bell, p. 7.

#### ANATOMICAL CHARACTERS.

Similar to those of Caraba, No. 14, and No. 14 Frontispiece, with the following differences. (See also Stone 27a, Pl. III., fig. 24).—

*Transverse Section*.—Rather darker than the other sections.

*Pores*.—Visible with the naked eye, much smaller and more numerous than in No. 14. Mostly single, a few Radial groups of 2-5 Pores. Empty.

*Rays*.—Regular, much less than the width of a Pore apart; so closely packed that the space between them is scarcely equal to their width; avoiding the Pores, but not undulating so much as in No. 14.

*Rings*.—Well defined; boundary a fine line of Soft Tissue scarcely visible to the naked eye; average number per inch of radius, in my specimens, 11'25.

*Soft Tissue*.—Of definite arrangement; type of Carapa, No. 14, but no lateral extensions (wings) to the Pores.

*Pith*.—About  $\frac{1}{8}$  in. in diameter, soft, red.

*Radial Section*.—The Pores are empty, reddish scratches. The Rays are very inconspicuous. In Tangential Section they are minute, 1 cell wide by 5-20 cells high.

*Type Specimens*.—Authenticated by Bell, No. 54/2710.

## 55.—PENTACLETHERA FILAMENTOSA, BTH.

*Nat. Ord.*, LEGUMINOSÆ. *Synonym*, P. BREVIFOLIA. BTH.

*Alternative Names*.—"Koorooballi, Trysil" (2). "Trisle" (24a). "Bois mulâtre, Palo mulato" (4a). "Parana-cache" (21).

*Salient Features*.—A solid, dark red, coarse-grained, rather heavy wood.

*Physical Characters*.—Weight (so far recorded),  $49\frac{3}{4}$ - $50\frac{1}{4}$  lbs. per cubic ft. Hardness, Grade 5, rather hard; compare Ash, Elm. "Extremely hard" (21). Smell 0. Taste astringent.

*Colour of Heartwood*, as above. "Variegated red-brown" (2). "Purplish-brown variegated with numerous small dark spots" (21). Darkens a little on exposure to the air; surface clean to bright; well defined from the Sapwood which is reddish-white to reddish-oatmeal colour.

*Bark*.—(?) About 1 in. thick. Surface of log under bark finely ribbed.

*Uses, Qualities, etc.*—"Floor-beams and framing, and the smaller sizes for spars and firewood. Is readily procurable in logs up to 40 ft. in length, squaring 10 ins." (2). Easy to saw; planes moderately hard and badly; polishes indifferently. A handsome wood which may be useful for furniture. Sometimes confused with Koorooboorelli, No. 73, and Courbaril, on account of the similarity in the names.

*Authorities*.—2. Bell, p. 9. 4a. Boulger, p. 426. 12. Hawtayne, p. 384. 20. McTurk, p. 2. 21. Miers. 24. Rodway.

## ANATOMICAL CHARACTERS.

Similar to those of Hoorowassa, No. 37; Hyariballi, No. 39; Purpleheart, No. 73; and Hoorooballi, No. 35, and No. 39 Frontispiece.

*Transverse Section*.—Much darker than the other sections.

*Pores*.—Visible with the unaided eye on account of their size and white contents, large, conspicuous; mostly single, many pairs radially or tangentially sub-divided, and a few groups or nests of 4-5 Pores, no linear groups.

*Rays*.—Difficult to see under any circumstances; less than the width of a Pore apart.

*Rings*.—Sometimes defined; boundary (?) a fine line of Soft Tissue.

*Soft Tissue* as in Hoorowassa; simply in sheaths round the Pores; also a fine concentric line (ring-boundary).

*Pith*.—(?)

*Radial Section*.—The Pores are coarse grooves, darker than the ground tissue; many containing dark or ruby resin or gum.

*Tangential Section* as the Radial, but the Rays need the lens, being minute.

*Type Specimens*.—Authenticated by Bell, No. 55/2711. The wood described in 27a, pp. 84, 86, is not this species.

## 56.—DIPTERYX ODORATA. WILLD.

*Nat. Ord.*, LEGUMINOSÆ.

*Synonyms*, COUMAROUNA ODORA. AUBL. C. ODORATA. AUBL.

BARYOSMA TONGO. GAERTN. HEINZIA PEREGRINA. J. F. GMEL.

(TARALEA and BOLDUCIA = DIPTERYX.)

*Alternative Names*.—"Kumara, Tonka-bean tree" (2); "Coumarou, Gaiac, Coumarcurana, Tarale" (1) probably refer to *Dipteryx oppositifolia*; "Tonkin-bean" (20); Cumaru; Cumbari; Faver de Tonca; "Tonga-bean" (21); "Couamara" (16a); "Coumarue, Fr.; Koemarie, Dutch; Koemara, Eng." (3). Not Cumary. "Tonga-bean wood," mentioned by Lindley under the name *Alyxia buxifolia* R. Br., is apparently a different species to the present. "Sarrapia" in Cayenne; "Bois de Savane"; "Gayac de Cayenne" in Guyane Fr. (20c).

*Salient Features*.—"A variegated, close-grained, heavy hardwood, red-brown in colour" (2).

*Physical Characters*.—Weight (so far recorded), 64½-67½ lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Smell or taste 0.

*Colour of Heartwood* "Brune" (1); "reddish-brown with stripes" (21); Nut-brown veined with pale brown or yellow. Darkens but little on exposure to the air; surface bright; clearly defined from the Sapwood. Colour of Sapwood, "Blanc" (1); pale brown; greyish-brown; width about 1½ ins.

*Bark*.—About ¼ in. thick, full of hard, white bodies; crumbling externally, exposing different coloured layers (brown and pale yellow).

*Uses, Qualities, etc.*—"Mill-beds, naves of cartwheels" (2); "exceedingly tough and durable, and is useful for cogs and

shafts—average height 90 ft., and will square 22 ins.” (20). Hard to saw. Fissile, takes nails badly; planes very badly; turns hard and badly; very cross-grained and troublesome. It should make good paving blocks.

*Authorities.*—1. Aublett. 2. Bell, p. 7. 3. Berkhout, p. 22. 4a. Boulger, pp. 423, 425. 12. Hawtayne, p. 386. 16a. Kew Guide, p. 38. 17. Laslett, p. 450. 18a. Lindley, p. 1158. 20. McTurk, p. 5, Martin-Lavigne (20c), p. 105. 21. Miers. 28. Wiesner, p. 90.

#### ANATOMICAL CHARACTERS.

The same as those of Trysil, No. 55, and No. 39, Frontispiece, with the following differences:—

*Transverse Section.*—The Rings are apparently well defined; boundary (?) a rather broad zone, poor in Pores here and there. Soft tissue in broad borders of light colour around the Pores, sometimes connecting two or more groups.

*Radial Section.*—The Pores are fine to medium scratches, usually obscured by the hoary Soft Tissue; sinuous; often contain gum. The Rays are minute, semi-transparent, inconspicuous flakes. The Rings are scarcely indicated.

*Tangential Section* as the Radial, but the Rays, on account of their alignment, create the appearance of fine shading or “half-tone” on the surface. They are about 25 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 58/2712.

#### 57.—NOT IDENTIFIED.

*Alternative Names,* “KURAHARA, KURAHURA” (2).

NO. 57, FRONTISPIECE.

*Salient Features.*—A reddish or reddish-brown, lustrous wood of uniform colour. Very cross-grained, rather soft and of medium weight.

*Physical Characters.*—Weight (so far recorded), 50½ lbs. per cubic ft. Hardness, Grade 6, firm; compare Beech. Smell or taste 0. Surface bright. Heartwood not well-defined from the Sapwood; darkens a little on exposure to the air. Colour of Sapwood the same but lighter; width about 1½ ins.

*Bark.*—About ¼ in. thick, rough, fissured, corky and scaling. Scales soft, red in section and laminated. Innermost layer of Bark, laminated, showing silver-grain (Rays) in Radial Section. Middle layer ⅓ in. thick, firm, dark brown. Surface of log beneath Bark ribbed or grooved.

*Uses, Qualities, etc.*—“Used for making corials and boards for punts and ballahoes. Readily procurable in logs up to 50 ft. in length, and squaring up to 20 ins.” (2). Saws easily. Fissile, takes nails badly; turns moderately easily but badly; polishes indifferently. A wood of good appearance which should compete with the inferior grades of Mahogany.

*Authority.*—2. Bell; p. 7. 12. Hawtayne, p. 386.



## ANATOMICAL CHARACTERS.

Those of Calophyllum.

*Transverse Section*.—Rather darker in shade than the other sections.

*Pores*.—Readily visible with the naked eye on account of their tree-like or branching arrangement; not diminishing towards the close of the season's growth, little variation except in the groups; evenly distributed in straggling lines in a more or less Radial direction (actually in disconnected groups or strings of Pores).

*Rays*.—Visible with powerful lens only; extremely fine, uniform, regular, much less than the width of a Pore apart, lightly avoiding them.

*Rings*.—Boundary (?) a fine line of light-coloured Soft Tissue, concentric but irregularly bent and broken; contour irregular.

*Soft Tissue* of definite arrangement; type of Calophyllum. See under "Rings" above. Also encircling or sheathing the Pores, and connecting them into the straggling lines.

*Pith*.—(?)

*Radial Section*.—The Pores are rather fine, darker coloured lines, cross-grained, *i.e.*, of oblique course, so that at some parts of the surface they are cut across, and at others they run parallel with the surface of the wood. The Rays are very fine, just perceptible flakes. The Rings are difficult to trace.

*Tangential Section* as the Radial, but the Rays need the microscope, being minute, and are about  $\frac{2}{3}$  m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 57/2713.

## 58.—SPECIMEN MISSING.

If it be *Icica altissima* as reported by Bell (2) it will be the same as No. 69, which see.

## 59.—NOT IDENTIFIED.

*Native Name*, "LANABALLI" (2). Not LANA (0).

*Salient Features*.—A soft, light wood of a brownish or oatmeal colour.

*Physical Characters*.—Weight (so far recorded),  $38\frac{1}{4}$  lbs. per cubic ft. Specimen was unsound. Hardness, Grade 7, soft; compare Pine. Taste or smell 0.

*Colour of Heartwood* "whitey-brown" (2): Darkens but little on exposure to the air. Apparently a Sapwood tree. Surface lustrous.

*Bark*.— $\frac{1}{8}$  in. thick, nearly smooth; brown; full of long white bodies. Surface of log beneath Bark striated.

*Uses, Qualities, etc.*—"Used for making paddles, boat-oars. Is readily procurable in small sizes" (2). Saws very easily. Fissile, takes nails badly; planes and turns easily but indifferently; not suitable for polishing. The conditions of the test piece were bad. Of no export value.

*Authorities*.—0. Rev. J. Aiken, MS. and collection. 2. Bell, p. 7.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—A trifle darker than the other sections.

*Pores*.—Just visible with the naked eye as holes; large, little variation except in the groups. Evenly distributed; few and widely separated; single or in pairs, the septa which divide them often being Radial.

*Rays*.—Visible with the lens; uniform; irregular, much more than the width of a Pore apart; yellowish; few; not avoiding the Pores. Brown in my specimen, which is, however, tainted with decay.

*Rings*.—Apparently defined under the lens; boundary (?) a fine line of Soft Tissue; contour regular.

*Soft Tissue* of definite arrangement; the supposed boundary line also narrowly encircling the Pores.

*Pith*.—(?)

*Radial Section*.—The Pores are coarse, brown scratches, darker than the ground. The Rays are conspicuous, though small, flakes. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute and about 1 m/m. high.

*Type Specimen*.—Authenticated by Bell, No. 59/2715. Aiken's specimen, "Lana," No. 3026, is not this species. He names it *Genipa americana*.

## 60.—BROSIMUM AUBLETTII. Sw.

*Nat. Ord.*, URTICACEÆ.

Under this name a wood with a "White Heart" is described by Aublett (1). It cannot have any connection with the present species.

*Alternative Names*.—"Letter-wood, Snake-wood, Speckled wood, Buro Koro, Burracurra (not Barrakarra), Paira, Leopard-wood" (7); "Cangica (not Angica)" (1); "Pae Rainha de Listras in Guiana and the Amazonas Region; Gamelleira preta in Pernambuco" (21); "Bois lezard, in the Leeward Islands, Gatia, Gateado, in Brazil" (7); "Buchstabenholz, Tigerholz" (28); "Letternholz, Lignum litteratum" (16); "Bois de Lettre à grandes Feuilles" (6); "Bois de Lettre moucheté" (5); "Brazil-wood" (9); "Muirapenima, Pao Tartarugo in Brazil" (7); "Muskatholz" (20c). "Bois de lettres de Chine"; "Piratiner" in Guyane Fr. (20c). Devenish mentions (16) some of these names under the synonym of *Brosimum guianense*, and Martin-Lavigne describes the same wood under the name of *Piratinera guianensis* (20c).

*Salient Features*.—A dark brown or chocolate-coloured wood, marked in a striking manner with small patches of rich nut-brown, bearing a fanciful resemblance to the markings on a snake skin. Hard, heavy and cold to the touch.

*Physical Characters*.—Weight (so far recorded), 77-83 lbs. per cubic ft. Hardness, Grade 1, excessively hard; compare Ebony.

Smell 0. Taste faint, insipid. Heartwood sharply defined from Sapwood; surface lustrous; darkens considerably on exposure to the air. Sapwood brownish-yellow, like Boxwood; width from  $3\frac{1}{2}$ -6 ins.

*Bark*.—(?) "Blueish" (21).

*Uses, Qualities, etc.*—Walking sticks, inlaying, bows, Tunbridge ware, etc. An extremely beautiful wood which takes a superb finish, but it is already rare, and is becoming more so. Procurable in small pieces only. Very hard to saw; too hard for nails; planes hard and is very variable; turns hard and badly when light-coloured and stripy; polishes well. Well-known and appreciated in Europe. Never confused with any other wood except on account of the similarity of one of the native names with Barracarra, Angica, False Letterwood, No. 87, etc.

*Authorities*.—1. Aublett. 2. Bell, p. 7. 4a. Boulger. 5. Cat., Col., Fr., p. 27. 6. Coudreau. 7. DaGama. 9. Dalton, p. 211. 12. Hawtayne, p. 387. 13. Royle, p. 106. 10. Devenish, p. 423. 16. Icones Lignorum, Pl. IV., No. 2. 17. Laslett, p. 450. 20. McTurk, No. 57. 21. Miers. 27a. Stone, p. 203. Pl. XIII., fig. 112. 28. Wiesner, p. 905. 20c. Martin-Lavigne, p. 51.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—Much darker than the other sections.

*Pores*.—Rather prominent; little variation; sub-divided in groups of from 2-13 Pores; not very numerous, from 10-17 per square m/m.; filled with ruby or dark resin or "curious thick-walled Thyloses" (28).

*Rays*.—Visible with the lens; fine; uniform; equi-distant; lightly avoiding the Pores; brown.

*Rings*.—Doubtful; boundary a zone richer or poorer in Pores here and there.

*Soft Tissue*.—Encircling the Pores and extending laterally into wings; width of wings equal to that of the Rays.

*Pith*.—(?)

*Radial Section*.—This is the section showing the markings from which some of the popular names are derived. Pores inconspicuous, though large, being lost amongst the black markings; usually filled with dark resin. The Rays are fine, narrow, brown flakes; lustrous; abundant at times and obscuring the black zones in patches, thus causing the characteristic markings. The Rings are not indicated, but the dark or black pigment zones are very prominent.

*Tangential Section* as the Radial, but the effect caused by the Rays is, of course, absent; the latter appear as minute, inconspicuous lines about 5 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 60/2716. Imp. Inst., No. 0420, and others from commercial sources. The species has not been identified by means of the leaves (there were no fruits),

but as the wood is so little likely to be mistaken for any other, I feel sure that it is correctly named as above.—H.S.

### 61.—NOT IDENTIFIED.

*Nat. Ord.*, SAPOTACEÆ. *Native Name*, "MAMMOORIBALLI" (2).

*Salient Features*.—A hard, heavy, dull brownish-red wood, something like Balata wood, No. 12. Close and fine-grained, solid and compact.

*Physical Characters*.—Weight (so far recorded), 39 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Smell 0. Taste insipid, unpleasant.

*Colour* of Heartwood darkens but little on exposure to the air; not well defined from the Sapwood. Surface dull. Sapwood (?). The whole of the wood is of much the same colour.

*Bark*.— $\frac{1}{8}$ – $\frac{1}{4}$  in. thick, flaking in thin, almost papery scales; brown within. Inner layer of soft, bristly fibres; the outer, woody. Surface of log beneath bark, finely striated.

*Uses, Qualities, etc.*—"House framing, and by the Indians for arrow heads—grows to a height of 50 ft., but small" (2). "Average height 70 ft., can be had to square 16 ins. The wood is tough and hard, suitable where it will not be exposed to the weather" (20). Rather hard to work. Fissile, takes nails badly; planes moderately hard but well; turns hard and badly; polishes indifferently. Of doubtful export value.

*Authorities*.—2. Bell, p. 8. 12. Hawtayne, p. 384. 20. McTurk, p. 3.

### ANATOMICAL CHARACTERS.

Similar to those of Bullet-wood, No. 12, Hymarikushi, No. 40, see Frontispiece, Morakokuru, No. 68, and Mora-balli, No. 66, with the following differences:—

*Transverse Section*.—Darker than the other sections.

*Pores*.—Conspicuous, readily visible with the unaided eye, contrasting strongly with the ground, but less so than in No. 68; contents sparkling.

*Radial Section*.—The Pores have no red contents.

*Type Specimens*.—Authenticated by Bell, No. 61/2717.

### 62.—SYMPHONIA GLOBULIFERA. LINN.

*Nat. Ord.*, GUTTIFERÆ. *Native Name*, "MANNI-BALLI"  
"ANANY" IN BRAZIL, PROV. D'AMAZONAS (2).

*Salient Features*.—A greenish-brown wood of medium weight. Soft. Transverse Section exhibits a mass of fine, light-coloured, concentric lines. Sapwood dark.

*Physical Characters*.—Weight (so far recorded), 89½ lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell or taste 0.

*Colour* of Heartwood quite uniform greenish-brown; darkens somewhat on exposure to the air; sharply defined from the Sapwood; lustrous in Radial Section. Colour of Sapwood dark grey, much darker than the Heartwood; width about  $\frac{1}{2}$  in.

*Bark*.—About  $\frac{1}{4}$  in. thick, of one layer (plus the epidermis), containing hard, white rods; can be crumbled with the finger nail. Smooth outside. Closely adherent. Surface of log beneath Bark finely striated.

*Uses, Qualities, etc.*—"Readily procurable in logs up to 45 ft. in length, and squaring 12-14 ins." (2). Saws easily. Fissile, takes nails badly. Planes easily and well; turns moderately easily but badly; polishes indifferently. Of doubtful value for export. Sometimes confused with Manniriballi, No. 63, on account of similarity of name.

*Authorities*.—2. Bell, p. 8. 12. Hawtayne, p. 385. 17. Laslett, p. 453. 20. McTurk, p. 4.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—Darker than the other sections.

*Pores*.—Just visible with the naked eye as fine white specks, not diminishing towards the close of the season's growth; little variation except in the pairs, where one Pore is larger than the other. Evenly distributed, isolated, widely but uniformly scattered; few. Some contain gum which reflects the light and makes the section sparkle. Mostly single, a few pairs.

*Rays*.—Visible with the lens, very fine; uniform; regular, less than the width of a Pore apart; very many; apparently not avoiding the Pores; firm and direct, though so fine; similar in colour to the Soft Tissue.

*Rings*.—Not always defined; boundary an interruption of the regular succession of the fine whitish lines; contour regular; oval flecks here and there.

*Soft Tissue* of definite arrangement; a multitude of fine, light-coloured, wavy, closely packed, continuous, concentric lines, connecting the Pores; readily visible with the naked eye.

*Pith*.—(?)

*Radial Section*.—Lighter in shade than the other sections. The Pores are rather coarse, yet not prominent grooves, mostly containing shining beads of gum, and sometimes a white deposit. The Rays are fine, inconspicuous, semi-transparent lines. The Rings are rarely traceable.

*Tangential Section* as the Radial but duller. Under the lens the Soft Tissue appears as innumerable, closely set, vertical lines. The Rays need the microscope, being minute and about  $\cdot 25$  m/m. high.

*Type Specimen*.—Authenticated by Bell, No. 62/2718.

#### 63.—NOT IDENTIFIED.

*Nat. Ord.*, Probably URTICACEÆ.

*Native Name*, "MANNIRIBALLI" (2).

*Salient Features*.—A light, soft wood finely streaked with hoary lines. Colour as below.

*Physical Characters*.—Weight (so far recorded),  $41\frac{1}{2}$  lbs. per cubic ft. Specimen was unsound. Hardness, Grade 6, firm; compare Beech. Smell or taste 0.

*Colour of Heartwood* "as Greenheart" (2). Light brown; dull brown; darkens but little upon exposure to the air; sharply defined from the Sapwood. Sapwood the colour of oatmeal; width about  $2\frac{1}{2}$  ins.

*Bark*.—About  $\frac{1}{3}$  in. thick, smooth, skinny and brittle; on the inner surface are the impressions of the ends of the Rays (lens). Surface of log beneath Bark, smooth or striated.

*Uses, Qualities, etc.*—"A furniture wood. Is readily procurable in logs of 20-25 ft., squaring 8-12 ins." (2). Saws easily. Fissile, takes nails badly; turns and polishes indifferently. The tests are hardly fair, as the specimen was unsound. The wood has a certain amount of lustre, but otherwise there is not much to recommend it. Sometimes confused with Manni-balli, No. 62, on account of the similarity of the names.

*Authority*.—2. Bell, p. 8.

ANATOMICAL CHARACTERS similar to Caraba-balli, No. 16.

*Transverse Section*.—Similar in shade to the other sections.

*Pores*.—Readily visible with the naked eye, conspicuous as holes; not diminishing but rather enlarging towards the close of the season's growth, sometimes the largest Pores are in the middle of the Ring. They increase greatly as the tree ages. In my specimen the Pores of the fifth Ring are twice as big as those of the first. Evenly distributed; few and widely spread.

*Rays*.—Visible with the naked eye to good sight (after moistening); fine, uniform, regular, about the width of a Pore apart, or less, scarcely avoiding the Pores.

*Rings*.—Boldly defined; boundary a zone of dense wood contrasted with the following laxer wood; contour regular; number per inch of radius averages 1'44.

*Soft Tissue*.—Of definite arrangement; type of Fustic (Stone 27a, Pl. XIII., and fig. 3), *i.e.*, in concentric festoons uniting the Pores.

*Pith*.—(?)

*Radial Section*.—Similar in shade to the other sections or nearly so. The Pores are rather coarse, open grooves bordered by hoary soft tissue; quite inconspicuous in some cuts. The Rays are extremely minute, just visible flakes. They give the section a shaded appearance. The Rings are scarcely indicated, a slight contrast here and there.

*Tangential Section* as the Radial, but the Soft Tissue is much more prominent, and the Rays need the lens, being microscopic and about 1 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 63/2719.

#### 64.—NOT IDENTIFIED.

*Native Name*, "MARCIBALLI" (2).

Not the "Marsiballi" described by Martin-Lavigne (20c), p. 147.

*Salient Features.*—A hard, heavy wood of an uniform nut-brown colour; fine-grained and solid.

*Physical Characters.*—Weight (so far recorded), 61½ lbs. per cubic ft. Hardness, Grade 3, very hard. Smell 0. Taste little if any. Heartwood darkens but little upon exposure to the air, not defined from the Sapwood. Surface clean. (?) a Sapwood tree.

*Bark.*— $3\frac{1}{2}$  in. thick, smooth like that of Sycamore; hard and woody, brown within. Of two layers, the inner fibrous and bristly; the outer and thicker of the two is harder. Surface of log beneath Bark, finely striated.

*Uses, Qualities, etc.*—"Should make excellent scantlings as it is a lasting wood, and insects do not attack it. Is readily procurable in logs up to 40 ft. in length, squaring 9-12 ins." (2). Very hard to saw. Fissile, takes nails badly; planes and turns very badly, though moderately easily; polishes indifferently. Of no value for export as a furniture wood, but as it is hard and said to be durable, it may be useful as a paving wood. Specimen, however, was unsound.

*Authorities.*—2. Bell, p. 8. 12. Hawtayne, p. 387.

#### ANATOMICAL CHARACTERS.

Superficially the same as those of Wamara, No. 92.

*Transverse Section.*—A trifle darker than the other sections.

*Pores.*—Generally visible with the naked eye from their light colour; not diminishing towards the close of the season's growth, little variation, nearly (if not quite) all single; evenly distributed; few, and widely scattered.

*Rays.*—Just visible to the naked eye to good sight, very fine; uniform; regular, very close, much less than the width of a Pore apart. With the lines of Soft Tissue they form a fairly regular network.

*Rings.*—Apparently defined; boundary a zone of less dense wood here and there; uncertain and often difficult to locate; contour nearly regular; number per inch of radius in my specimens, 11 on an average.

*Soft Tissue* of definite arrangement; type of Lecythis, No. 45, i.e., a great number of fine lines crossing the Rays, with which they make a fine net-work, as they are about the same colour, width and distance apart.

*Radial Section.*—The Pores are fine, open grooves; not numerous. The Rays are small but readily visible, lighter-coloured flakes. The Rings are not indicated. The Soft Tissue is visible with the lens, and appears as fine parallel lines.

*Tangential Section* as the Radial, but lacking the silver-grain and the fine lines of Soft Tissue; the Rays need the lens being minute.

*Type Specimens.*—Authenticated by Bell, No. 64/2720. DaGama mentions a wood under the name of "Marsiballi," *Tecoma leucoxylon*. Mart.

## 65.—DIMORPHANDRA MORA. BTH., ET HOOK.

*Nat. Ord.*, LEGUMINOSÆ.*Synonyms*, D. EXCELSA. BAILL.; D. GUIANENSIS. BAILL.; MORA EXCELSA. BAILL., ET BTH.

*Alternative Names*.—"Mora" (2); "Moreira in the Amazonas Region" (21); "Moral" (4a); "Peto, in Dutch Guiana" (3). "Muro, in Trinidad" (10). (Not Mora-balli nor Mora-bucquia. Mora, meaning Mulberry, is applied to many different trees).

*Salient Features*.—A hard, heavy wood of coarse grain and dark brown or reddish-brown colour, streaked with white or brown lines.

*Physical Characters*.—Weight (so far recorded), 57-68½ lbs. per cubic ft. Hardness, Grade 2-3, compare Blackthorn to Ebony. Smell 0. Taste bitterly astringent, but this is not apparent until the shavings have remained in the mouth for some time. Solution the colour of brown brandy. Heartwood sharply defined from the Sapwood; surface lustrous, darkens but little on exposure to the air. Sapwood yellowish or light brown, width about 2 ins.

*Bark*.—About  $\frac{1}{8}$  in. thick, brown, hard, scaling in roundish flakes. Surface of log beneath Bark quite smooth.

*Uses, Qualities, etc.*—"Very durable, more so than Teak—ship building—tough, strong, polishes well, star-shake frequent—recommended for the larger parts of ships and buildings, also piles; rated first-class at Lloyd's" (17a). See Laslett for mechanical tests. Schomburgk (26), gives it unstinted praise. "Does not splinter, resists dry rot. There are three varieties, the Red, the White, and Mora-bucquia (?). The latter is not durable" (21). "Mora may be met with in logs of 18-35 ft. in length by 12-20 ins. square. It is the largest tree of British Guiana, and grows to a height of as much as 150 ft. When large it is generally hollow (20). Mora does not resist the Teredo, vide a specimen in the Museum, No. 1, Kew, which is honeycombed by them. It turns badly; planes well and smoothly when of good quality; is hard to saw. Fissile, takes nails badly; rends evenly; polishes well. "Sleepers are said to last 50 years" (27b). "One of the best woods in the Colony for railway sleepers, paving and ship-building—is readily procurable all over the Colony" (2). It is a handsome wood, but its appearance is sometimes marred by white secretion. It is worthy of more attention in Europe. Sometimes confused with Mora-balli, No. 66, Morakokuru, No. 68, and Mora-bucquia, No. 67, on account of the similarity of the names.

*Authorities*.—1. Barham. 2. Bell, p. 8. 3. Berkhout. 4a. Boulger, p. 430. 5. Cat., Col. Fr., p. 29. 19. Devenish. 12. Hawtayne, p. 94. 13. Royle, p. 94. 16a. Kew Guide, p. 38. 17a. Laslett, p. 275. 20. McTurk, p. 6. 21. Miers. 26. Schomburgk, 27a. Stone, p. 94, Pl. VI., fig. 52. 27b. *Timber Trades Journ.*, February 1st, 1902.



## ANATOMICAL CHARACTERS.

*Transverse Section*.—Darker than the other sections.

*Pores*.—Very prominent giving the wood a "caney" appearance (17a); large; little variation; evenly distributed over the whole section; few, 17-40 per sq. m/m.; in groups of 1-6 Pores irregularly or radially sub-divided; groups enclosed in patches of soft tissue which may connect two or three of them together; they occasionally contain gum or a white deposit.

*Rays*.—Visible with lens, fine, uniform, equi-distant, about the width of a large Pore apart; weak but scarcely avoiding them; numerous, 5-7 per m/m.; of nearly the same colour as the Soft Tissue.

*Rings*.—Well defined, but hardly prominent; boundary a very fine line of Soft Tissue; contour regular.

*Soft Tissue* prominent; abundant in broad patches embedding and connecting the Pores in an oblique or concentrically-waved fashion. Also the fine boundary line. That portion of the Soft Tissue which is near the Heartwood becomes coloured earlier than the woody fibres of the ground. Heartwood well, but not sharply, defined from the Sapwood which is light brown and about 2 ins. wide. Surface of Heartwood clean, scarcely bright.

*Pith*.—(?)

*Radial Section*.—Considerably lighter in shade than the Transverse. The Pores are very prominent, light brown when bordered with Soft Tissue or chalky when filled with white matter. The Soft Tissue is readily visible as hoary borders to the Pores, but is scarcely prominent.

*Tangential Section* as the Radial, but the conspicuous Pores cause the wood to resemble that of a palm. The Rays need the lens, and are about 5 m/m. high. The Soft Tissue is the chief feature of this section, affording much contrast of colour and occupying at least half of the surface.

*Type Specimens*.—Authenticated by Bell, No. 65/2721. Berkhout, No. 2632. Laslett, Nos. 2313, 2564.

## 66.—NOT IDENTIFIED.

*Nat. Ord.*, SAPOTACEÆ. *Native Name*, "MORA-BALLI" (2).

*Salient Features*.—A hard, heavy, reddish-brown wood of uniform colour.

*Physical Characters*.—Weight (so far recorded), 68½ lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Smell or taste 0. Heartwood scarcely defined from the Sapwood, which has perhaps a little less red in it. Darkens but little on exposure to the air. Surface slightly frosted.

*Bark*.—About ½ in. thick, nearly smooth, hard, woody outside; fibrous within. Surface of log beneath Bark, smooth.

*Uses, Qualities, etc.*—"Is readily procurable, and should be capable of being used much as Mora, No. 65. The Indians use it for their arrow-points" (2). Firm, somewhat hard to saw. Fissile, takes nails badly; planes and turns hard but well; polishes indifferently. A useful wood as a substitute for Bullet-wood. If durable (which is uncertain) it would make good paving-blocks. Sometimes confused with Mora, Mora-bucquia and Morakokuru on account of the similarity of the names, and with Bullet-wood on account of the resemblance in the structure.

*Authority.*—2. Bell, p. 8.

#### ANATOMICAL CHARACTERS.

Those of Bullet-wood, No. 12, with the following differences. (See also 27a., Pl. X., fig. 83, in which, however, the Pores are less distinctly shown).

*Transverse Section.*—A little darker in shade than the other sections.

*Pores.*—Readily visible with the naked eye, the tree-like arrangement being conspicuous in the dark wood. When moist, they are less visible. It is almost impossible to detail any points of difference between this species and Bullet-wood, apart from the colour, which is variable. The branching strings of Pores perhaps occupy less space than in the latter wood, where they occupy about half of the transverse surface of the wood. They are more continuous in Mora-balli than in Hymarikushi, No. 40. They are less bold and striking, while the Soft Tissue is rather more regular and better developed than in Mamooriballi, No. 61.

*Type Specimens.*—Authenticated by Bell, No. 66/2722.

#### 67.—NOT IDENTIFIED.

*Nat. Ord.*, LEGUMINOSÆ. Near DIMORPHANDRA MORA.

*Native Name*, "MORABUCQUIA" (2).

*Salient Features.*—A hard, very close-grained, heavy, reddish wood, inclined to be stripy. Pores prominent on a Transverse Section.

*Physical Characters.*—Weight (so far recorded), 61½-67 lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew or Hornbeam. Smell 0. Taste bitterly astringent; powerful.

*Colour* of Heartwood red, uniform, the colour being made up of red, white and brown lines. Surface bright, almost lustrous. Darkens but little on exposure to the air; well, but not sharply, defined from the Sapwood. The latter is light brown, and 1-1½ ins. wide.

*Bark.*—About 1½ in. thick, smooth, hard, woody, of one layer. Shows red, conical rods in Transverse Section, the large ends outwards opposite the ends of the Rays of the wood (needs lens); flakes in irregular scales exposing red patches. Surface of log beneath Bark, finely striated.

*Uses, Qualities, etc.*—"Grows on the low land plentifully to a height of 50 ft.—squares up to 20 ins.—is used for the same purposes as Mora" (2). "Not durable" (20). Firm, saws somewhat hard. Fissile, takes nails badly; planes and turns moderately hard but well; polishes indifferently. A rather handsome wood, but of doubtful export value. From the conflicting opinions above the conclusion may be drawn that the quality of this wood differs according to whether grown on high or low ground. Sometimes confused with Mora, No. 65, Moraballi, No. 66, and Morakokuru, No. 68, on account of the similarity of the names.

*Authorities.*—2. Bell, p. 8. 12. Hawtayne, p. 387. 20. McTurk, p. 6.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—Much darker than the other sections.

*Pores.*—Easily visible with the naked eye on account of their light colour; not diminishing in size towards the close of the season's growth; uniform; little variation except in the groups. Evenly distributed, scattered; single, some pairs and a few groups of 3-5 Pores tangentially sub-divided; many contain a white deposit.

*Rays.*—Visible with the lens, very fine, uniform; irregular, sometimes more than the width of a Pore apart, sometimes less; slightly avoiding the Pores; nearly the same colour as the Soft Tissue.

*Rings.*—Doubtfully defined; boundary (?) a very fine line of Soft Tissue, but as these lines sometimes run into one another, and as there are sometimes as many as six in the space of  $\frac{1}{16}$  in., it is not safe to regard them as boundaries; contour regular; number per inch of radius averaging, in my specimens, 19.5.

*Soft Tissue* of definite arrangement; type of Purpleheart, No. 74. See also Stone 27a., Pl. VI., fig. 47. Prominent in lozenge-shaped patches embedding the Pores; also the Ring boundary.

*Pith.*—(?)

*Radial Section.*—The Pores are almost imperceptible scratches, except where the white deposit shows them up. The Rays are inconspicuous, semi-transparent lines, which sometimes give the wood a speckled appearance. The Rings are not indicated, but the borders to the Pores (Soft Tissue) cause the lines to be of light colour.

*Tangential Section* as the Radial, but the Rays need the lens, being minute reddish lines, and are about .25 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 67/2728.

#### 68.—NOT IDENTIFIED.

*Nat. Ord.*, SAPOTACEÆ.

*Native Names*, "MORAKOKURU, MAMUSHI" (2).

*Salient Features.*—A close-grained, heavy, hardwood of a dark brown colour, similar to Mamooriballi, but of a brighter brown.

*Physical Characters.*—Weight (so far recorded), 69½ lbs. per

cubic ft. Hardness, Grade 2, extremely hard. Smell or taste 0. Heartwood not defined from Sapwood; darkens but little on exposure to the air.

*Bark.*—(?)

*Uses, Qualities, etc.*—"House-building. Is readily procurable in logs up to 40 ft. in length, squaring 6-9 ins." (2). Fissile, takes nails badly; planes hard but well; turns moderately hard and badly; polishes badly. Of doubtful value for export. Sometimes confused with Mamooriballi, No. 61, on account of the similarity in colour and general appearance.

*Authority.*—2. Bell, p. 8.

#### ANATOMICAL CHARACTERS.

The same as those of Bullet-wood, No. 12; Mamooriballi, No. 61; Hymarikushi, No. 40; and Moraballi, No. 66.

*Transverse Section.*—Pores readily visible with the unaided eye; the branching lines are very plain and contrast well with the ground, being much lighter, bigger and bolder and whiter than in Nos. 40 and 61, while the concentric lines of Soft Tissue are hardly so well developed and regular, but the Soft Tissue sheathing the Pores is very striking.

*Type Specimens.*—Authenticated by Bell, No. 68/2724.

#### 69.—PROTIUM ALTISSIMUM. MARSH.

*Nat. Ord.,* BURSERACEÆ.

*Synonyms,* P. ALTISSIMA. MARSH; AMYRIS ALTISSIMA. WILLD;

ICICA ALTISSIMA. AUBL; I. CUSPIDATA. H.B. ET K.

The wood described under the synonym of *Icica altissima* by Martin-Lavigne (20c), p. 86, is incorrectly named.

*Alternative Names.*—"Oolu" (2); "Cedar" (17a); "Cedre Blanc," Bagasse, Iciquier (4); "Acuzari-wood" (18a); "Cedre Blanc and Cedre Rouge are varieties, the latter is believed by the natives to be the more durable" (1); "Samaria-wood" (18a). "Soly" in Surinam; "Iciquier cedre" in Guadeloupe (20c).

*Salient Features.*—A light, soft, light-brown wood with a satiny lustre.

*Physical Characters.*—Weight (so far recorded), 31 lbs. per cubic ft. (Specimen was unsound.) Hardness, Grade 7, soft; compare Pine. Smell, none with present specimen. "Strong, aromatic" (20). "Aromatic" (18a). Taste little or none.

*Colour* of Heartwood as above; "Dirty whitey-brown" (2); "Pale cedar" (20). Darkens but little on exposure to the air; surface brilliant; satiny. Colour of Sapwood brownish, sharply defined from the Heartwood; width about 5 ins., but my specimen may be defective.

*Bark.*—About  $\frac{3}{8}$  in. thick, wrinkled, red, hard and woody. A thin, fibrous layer within, the greater part consisting of hard, whitish bodies in layers, readily visible to the naked eye. Surface of log beneath bark, smooth

*Uses, Qualities, etc.*—"Decays rapidly and is subject to attack by insects, and could only be used for inside boarding and such-like. Is very common in logs up to 40 ft. in length, squaring 18-20 ins." (2). Saws easily. Fissile, takes nails badly; planes and turns easily and well; polishes indifferently. Of little, if any, export value. "Used for canoes" (17a). Easily confused with Burada, No. 13, and Yellow Cirouaballi, No. 18, on account of the similarity in colour.

*Authorities.*—2. Bell, p. 8. 4. Boulger, p. 157. 12. Hawtayne, p. 386. 17a. Laslett, p. 381. 18a. Lindley, p. 17. 20. McTurk, p. 6, 20c. Martin-Lavigne, p. 86. 21. Miers.

#### ANATOMICAL CHARACTERS.

The same as those of Yellow Cirouaballi, No. 18, and No. 89, Frontispiece, with the following differences:—

*Transverse Section.*—The Pores are not readily visible with the unaided eye, though large. The Rays also are scarcely visible and are straight, not avoiding the Pores. The Rings are not defined.

*Radial Section.*—The Pores are darker than the ground. The Rays are readily visible, small, brownish flakes.

*Type Specimens.*—Authenticated by Bell, No. 69/2725

#### 70.—NOT IDENTIFIED.

*Alternative Names.*—"Pakoorie, Wild Mammee Apple" (2), (?) Parcouri (5).

*Salient Features.*—A reddish-white to light brown wood, of medium weight and hardness. The colour is in streaks. The structure in Transverse Section is unusually plain.

*Physical Characters.*—Weight (so far recorded), 61 lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew. Smell or taste 0. Heartwood sharply defined from the Sapwood; surface matt to bright; darkens but little on exposure to the air. Sapwood oatmeal colour; width about 3 ins.

*Bark.*—About  $\frac{3}{4}$  in. thick, hard. Inner layer about  $\frac{1}{2}$  in. thick, brown and woody. Outer layer scaling (with scales clearly marked off in vertical section); irregularly fissured; full of hard, whitish bodies in regular concentric layers. Surface of log beneath bark, striated or smooth.

*Uses, Qualities, etc.*—"Scarce—60 ft., squaring up to 20 ins.—used as a furniture wood" (2). Saws moderately hard; firm. Fissile, takes nails badly; planes well and easily; turns moderately hard and badly; polishes indifferently. Of little, if any, value for export. Sometimes confused with Irriariadanni, No. 42, on account of the similarity in colour and structure.

*Authorities.*—2. Bell, p. 8. 5. Cat., Col., Fr., p. 29.

#### ANATOMICAL CHARACTERS.

Similar to those of Irriariadanni, No. 42, with the following differences. Also of Washiba (cf. Stone 27a., Pl. VII., fig. 57).

*Transverse Section*:—

*Pores*.—Occasional groups of as many as 22 pores; groups of nine are frequent.

*Rings*.—Ill-defined; boundary doubtful; contour nearly regular.

*Soft Tissue*.—Contour of the concentric lines not lumpy, as in No. 42.

*Pith*.—(?)

*Radial Section* is marked with vertical red lines (the Soft Tissue), which show up better when moistened. The Rings are not indicated.

*Type Specimens*.—Authenticated by Bell, No. 70/2726.

### 71.—NOT IDENTIFIED.

*Alternative Names*, "PHOKADIE, FUKADIE" (2).

*Salient Features*.—A rather heavy, brown wood. "Resembles Greenheart" (2). It has a greenish tinge at times. Grain coarse and open.

*Physical Characters*.—Weight (so far recorded),  $57\frac{1}{2}$  lbs. per cubic ft. Hardness, Grade 3, rather hard; compare Blackthorn. Smell or taste 0. Heartwood not defined from Sapwood; surface clean to bright; darkens but little on exposure to the air. Colour of Sapwood brown; width (?).

*Bark*.— $\frac{3}{16}$ – $\frac{1}{2}$  in. thick, scaling in large, thick, irregular flakes; epidermis hard and brittle; finely laminated within, and easily separable into tow-like fibres. Surface of log under bark, finely striated.

*Uses, Qualities, etc.*—"Is readily procurable in logs up to 30 ft., squaring up to 14 ins.—should make good sills" (2). Rather hard to saw. Fissile, takes nails badly; planes and turns hard and badly; polishes indifferently. Of doubtful value for export. Sometimes confused with Greenheart, No. 29, on account of the similarity in colour.

*Authorities*.—2. Bell, p. 8, 12. Hawtayne, p. 385.

### ANATOMICAL CHARACTERS.

Similar to those of Trysil, No. 55, and No. 39, Frontispiece.

*Transverse Section*:—

*Pores*.—Readily visible with the naked eye, as large perforations; not diminishing towards the close of the season's growth, but increasing very considerably as the tree ages; unevenly distributed; in wide rings there is a distinct tendency to form oblique, straggling lines, which are often visible with the naked eye. Single or in oval sub-divided groups of 2-4 or more Pores.

*Rays*.—Readily visible with the lens or to good sight with the naked eye; fine; light-coloured; uniform; regular, much less than the width of a Pore apart; avoiding the Pores.

*Rings*.—Well-defined; boundary, a fine line of Soft Tissue just

visible without lens; contour irregularly undulating; number per inch of radius in my specimens averages 5.

*Soft Tissue* of definite arrangement, in patches, adjacent to or sheathing the Pores and Pore-groups.

*Pith*.—(?)

*Radial Section*.—The Pores are coarse, empty grooves, having chambers that are readily visible. The Rays are fine, very inconspicuous bars. The Rings are not indicated.

*Tangential Section* as the Radial, but in appearance much finer in the grain; the Rays need the lens, being minute and about 5 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 71/2727.

## 72.—NOT IDENTIFIED.

*Native Name*, "PHOOTEE" (2).

*Salient Features*.—A very light, very coarse-grained, dirty-coloured wood. Soft.

*Physical Characters*.—Weight (so far recorded), 26 $\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 8, very soft; compare White Pine. Smell or taste 0. Heartwood resembles that of American White Pine; not defined from the Sapwood; surface, matt; (?) a Sapwood tree. Darkens but little on exposure to the air.

*Bark*.—About  $\frac{1}{4}$  in. thick, nearly smooth; light brown or yellow; fibrous and bristly within.

*Uses, Qualities, etc.*—"Of no use except for kindling wood" (2). Saws easily; planes easily and well; turns easily and badly; unsuitable for polishing. Of no value for export. Sometimes confused with other white woods.

*Authority*.—2. Bell, p. 8.

### ANATOMICAL CHARACTERS.

*Transverse Section*:—

*Pores*.—Visible with the naked eye as holes, large, considerable variation; single or in groups of 2 to 4 Pores, nested or subdivided irregularly; evenly distributed; widely scattered; few.

*Rays*.—Just visible with the naked eye; white; uniform (?) irregular; rather less than the width of a Pore apart; scarcely avoiding the Pores.

*Rings*.—Not defined; boundary (?).

*Soft Tissue* of definite arrangement, surrounding the Pores and extending laterally into narrow wings. White, readily visible when moistened.

*Pith*.—(?)

*Radial Section*.—Surface bright. The Pores are very coarse, darker coloured grooves; empty. The Rays are readily visible by contrast (reflection). The Rings are not indicated.

*Tangential Section* as the Radial, but the surface is matt, as the Rays are just large enough to produce this effect, but the lens is needed to see them individually, being minute and about 1 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 72/2728.

## 73.—NOT IDENTIFIED,

but there is a marked resemblance between the wood of this species and that of *Pentaclethra filamentosa*, though not of the fruit and leaves.

*Nat. Ord.*, LEGUMINOSÆ.

*Alternative Names.*—"Purpleheart, Kooroo-boelli" (2); "Kooroo-bovilli" (20). Not the "Purperhart."

*Salient Features.*—A coarse-grained, medium hard, reddish brown wood; cross-grained; resembles Mahogany. Nothing like the Purpleheart of Commerce, which is No. 74.

*Physical Characters.*—Weight (so far recorded), 44½ lbs. per cubic ft. Hardness, Grade 5, rather hard; compare Ash or Elm. Smell or taste 0. Does not become purple on exposure to the air (?). Surface, lustrous and dull in patches. Sapwood, oatmeal-colour; width about 1 in.; well, but hardly sharply defined from the Heartwood.

*Bark.*—About ½ in. thick, like that of Beech. In two separable layers, smooth, brown, fibrous and rather hard within; the outer much harder. Surface of log under bark, finely ribbed.

*Uses, Qualities, etc.*—Planes and turns well and easily, but rapidly takes the edge off tools; hard to saw. Fissile; rends easily; takes nails badly; troublesome on account of its open grain, but finishes well. Sometimes confused with the other Purplehearts, as the systematic name *Copaifera* has long been applied to all of them. This is more especially the case with Kooroo-balli or Trysil, No. 55, as the resemblance of both name and wood seldom fails to create confusion. In fact, these two woods are difficult to distinguish even when laid side by side. In the literature of the subject one can never be sure to which wood an author refers.

*Authorities.*—2. Bell, p. 9. 7. DaGama. 20. McTurk.

## ANATOMICAL CHARACTERS.

Exactly those of No. 55, which see. Compare also No. 39, Frontispiece.

N.B.—This is not the Purpleheart which is sold as such on the English market. (See No. 74 for that wood.)

*Type Specimens.*—Authenticated by Bell, No. 74/2729.

## 74.—PELTOGYNE PANICULATA. Bth.

*Nat. Ord.*, LEGUMINOSÆ.

*Alternative Names.*—"Purpleheart, Saka" (2); "Sacka" (12); "Zapateri" (16a); "Guarubu, Guarubussu" (21); "Sapater, Fr., Zapatero, Sp., in Trinidad" (16); "Marawineroo, Marawayana" (20); "Purpuurhart, in Dutch Guiana" (12); "Bois Violet, Amarante, in French Guiana and Brazil, Purplewood, Bois du Cœur pourpre" (7).



*Salient Features.*—A hard, heavy, solid wood; brown when freshly cut, but rapidly becoming purple (magenta); cold to the touch.

*Physical Characters.*—Weight (so far recorded), 49-62 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. "Very hard and dense" (20). Smell or taste 0. Solution dark brown; the residue after evaporation, purple. Heating the wood when brown brings out the purple colour. A log received in a very wet condition, after being opened, turned colour as I watched it. Heartwood well, and sometimes sharply, defined from the Sapwood; surface bright or of a greasy lustre. Sapwood, dirty white; width about 2 ins.

*Bark.*—About  $\frac{1}{8}$ - $\frac{1}{4}$  in. thick; resembles that of Beech, but is of a brick-red colour. "Is used for wood-skins for canoes" (20). Hard; a thin white layer beneath the epidermis; closely adherent. Surface of log beneath bark, smooth.

*Uses, Qualities, etc.*—"Mill-beds, mortar-beds, house-framing and all purposes where shock has to be resisted—durable" (22). "Ramrods, buhl-work, marquetry and turnery" (13). "Less durable than Kooroobooilli; capable of resisting great strain; may be met with in logs from 100-120 ft. long by 30 ins. in diameter, free of Sapwood" (20). A wood that works well with all tools, although hard. It is well known and appreciated in Europe. The purple colour is dissipated by spirit polishes. Almost invariably confused with other Purplehearts on account of the similarity in the name, but not for any other reason.

*Authorities.*—2. Bell, p. 9. 7. DaGama, p. 9. 12. Hawtayne, p. 388. 13. Royle, p. 103. 16. Devenish, p. 423. 19a. Martin, p. 226. 20. McTurk, p. 6. Martin-Lavigne (20c), p. 96. 21. Miers. 16a. Kew Guide, p. 44. 27a. Stone, p. 84, Pl. VI., fig. 47. 28. Wiesner, p. 927.

#### ANATOMICAL CHARACTERS.

The same as those of Simiri, No. 81, but much more striking.

*Transverse Section.*—Much darker than the other sections.

*Pores.*—Readily visible with the unaided eye on account of the patches of Soft Tissue which surround them; uniformly distributed; few; single or in pairs and threes; often filled. Round when not sub-divided.

*Rays.*—Visible with the naked eye when the wood is moistened; very fine; uniform; more or less regular, about the width of a Pore apart; weak but otherwise straight; scarcely avoiding the Pores.

*Rings.*—Doubtful; boundary probably the fine line of Soft Tissue which appears here and there.

*Soft Tissue* of definite arrangement; very prominent and abundant in large spindle-shaped patches enclosing the Pores and often joining two or more groups. Also the boundary-line.

*Pith.*—(?)

*Radial Section*.—The Pores are inconspicuous though large; obscured by the Soft Tissue which forms numerous, narrow, grey borders to them. The Rays are prominent, though small, flakes.

*Tangential Section* as the Radial, but the Rings are sometimes traceable as cloudy lines or loops, and the borders to the Pores are several times as broad as in the Radial Section. The Rays need the lens, being minute and about 1 m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 74/2730. Imp. Inst., No. 0099.

This is the same wood as that described in 27a., p. 84. The Pao roxo, mentioned by Allemao as *Peltogyne Guarabu*, is probably this wood. This systematic name may be a synonym of *P. paniculata*, but it is not mentioned in the Index Kewensis.

## 75.—NOT IDENTIFIED.

*Native Name*, "ROOKOOROOKOO" (2).

*Salient Features*.—A coarse-grained, light, soft wood; white in colour.

*Physical Characters*.—Weight (so far recorded), 31 lbs. per cubic ft. Hardness, Grade 8, very soft; compare Pine (American White). Smell or taste 0.

*Colour* of Heartwood uniform; white to yellowish-white; darkens but little on exposure to the air; surface lustrous; not defined from the Sapwood; (?) a Sapwood tree.

*Bark*.— $\frac{1}{8}$ – $\frac{1}{4}$  in. thick, brown, sloughing off in sheets; outermost sheet of specimen dark brown, with very small vertical fissures; inner sheet smooth with very large ( $\frac{1}{8}$  in. diameter), roundish lenticels; hard; woody. Surface of log beneath bark, smooth.

*Uses, Qualities, etc.*—"Inside boarding, or for splitting up into matches. Is readily procurable in logs up to 30 ft. in length, squaring up to 18 ins." (2). Saws very easily. Fissile, takes nails badly; planes and turns easily but very badly; polishes indifferently. Export value nil.

*Authorities*.—2. Bell, p. 9.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—A trifle lighter in shade than the other sections.

*Pores*.—Just visible with the unaided eye; not diminishing towards the close of the season's growth; little variation; evenly distributed and widely scattered; single or in groups of 2-4 Pores radially disposed; few.

*Rays*.—Just visible with the unaided eye; uniform; regular; closely set, a little less than the width of a Pore apart; slightly avoiding the Pores. They occupy half of the surface of this section.

*Rings*.—Ill-defined; boundary a fine line or zone of denser wood, but not by any means clear enough to enable one to count the number per inch; contour regular.

*Soft Tissue* of definite arrangement; in excessively fine concentric bars connecting the Rays and making a ladder-like net-work with them (microscope needed).

*Pith*.—(?)

*Radial Section*.—Similar in appearance to Spruce or White Pine. The Pores are fine scratches; few; empty. The Rays are just visible, narrow, semi-transparent flakes, which are more visible when moistened. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the microscope, being minute and about  $\frac{1}{5}$  m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 75/2731.

## 76.—NOT IDENTIFIED.

*Native Name*, "SEEBADANNI" (2).

*Salient Features*.—A yellow wood of medium weight and hardness. Pores conspicuous on a transverse section.

*Physical Characters*.—Weight (so far recorded), 52 $\frac{1}{4}$  lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew. Smell 0. Taste rather astringent.

*Colour* of Heartwood, yellow to brown, banded light and dark; well defined from the Sapwood; darkens a little on exposure to the air; surface, lustrous, frosted. Sapwood, oatmeal colour; width,  $\frac{3}{4}$ -1 $\frac{1}{2}$  ins.

*Bark*.— $\frac{1}{4}$ - $\frac{1}{2}$  in. thick, woody, rather fibrous within; full of hard, white bodies; brown, wrinkled or lightly fissured externally. Surface of log under Bark, smooth or striated.

*Uses, Qualities, etc.*—"Often sold as Greenheart and used in the same way. Is readily procurable in logs up to 40-50 ft. in length, squaring 10-14 inches" (2). "Used for framing purposes (house-building), and can be had in large quantities" (20). Firm; saws rather easily. Fissile, takes nails badly; planes easily and well; turns moderately easily but badly; polishes indifferently. A much inferior wood to Greenheart, and would scarcely be expected to compete with that wood upon the European market.

*Authorities*.—2. Bell, p. 9. 12. Hawtayne, p. 384. 20. McTurk, p. 4.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—Nearly as light in colour as the other sections, but dull.

*Pores*.—Visible with the naked eye, prominent, large; yellow; not diminishing towards the close of the season's growth; little variation; rather irregularly distributed; apparently crowded; filled with yellow (or in the darker bands red) gum.

*Rays*.—Visible with the naked eye to good sight; very fine; yellow; uniform; rather irregular, rather less than the width of a Pore apart and lightly avoiding them.

*Rings*.—Occasionally defined; boundary, when present, a zone of denser wood which may be absent over large areas; contour regular.

*Soft Tissue* of no definite arrangement; narrowly sheathing the Pores only.

*Pith*.—(?)

*Radial Section*.—The Pores are very fine, just visible scratches glistening with beads of gum. The Rays are almost imperceptible without lens. The Rings are not often indicated, but the wood is conspicuously banded.

*Tangential Section* as the Radial, but the Rays need the lens, being minute.

*Type Specimens*.—Authenticated by Bell, No. 76/2732.

## 77.—VOUAPA BIFOLIA. AUBL.

*Nat. Ord.*, LEGUMINOSÆ.

*Alternative Names*.—"Sereebebe, meaning Water Wallaba" (20); "Saribebe, variously spelled" (12).

*Salient Features*.—A light red, rather coarse-grained wood, of uniform colour, rather soft. Would pass for a Mahogany.

*Physical Characters*.—Weight (so far recorded), 46 lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell or taste 0.

*Colour* of Heartwood sharply defined from the Sapwood; surface bright to lustrous; darkens but little upon exposure to the air. Sapwood, dirty pinkish-grey; width about 2 ins.

*Bark*.—About  $\frac{1}{4}$  in. thick, smooth, closely adherent, rather woody and full of brown grains. Outside of log beneath bark quite smooth.

*Uses, Qualities, etc.*—"Easily procurable in logs of 16-20 ft. squaring from 8-10 ins. (2). "Grows in the water at the edge of the river—never used" (20). Saws easily. Fissile, takes nails badly; planes easily but badly; turns moderately hard but indifferently: polishes but moderately well. A wood of good appearance which may compete as a furniture wood with common Baywood. Sometimes confused with Wallaba, No. 91, on account of the similarity in colour and name, and is regarded by McTurk as a variety.

*Authorities*.—2. Bell, p. 9. 12. Hawtayne, p. 388. 17. Laslett, p. 451. 20. McTurk, p. 4.

### ANATOMICAL CHARACTERS.

*Transverse Section*.—As light in colour as the other sections, but duller.

*Pores*.—Some visible with the naked eye on account of their white contents and size; not diminishing towards the close of the

season's growth, some variation in no particular order. Evenly distributed, widely scattered; many single, also groups of 2-7 Pores, radially or tangentially sub-divided.

*Rays*.—Visible with the lens, very fine; uniform; regular, equidistant, much less than the width of a Pore apart; interrupted by, but apparently not avoiding, the Pores. With the lens the Rays appear red, but if sufficiently magnified about half the cells are seen to be filled with crimson resin or gum.

*Rings*.—Sometimes defined; boundary a very fine line of Soft Tissue not visible without lens; contour regular.

*Soft Tissue* in patches, partly embedding the Pores (lens needed).

*Radial Section*.—The Pores are coarse, open grooves, mostly containing cell-débris or white deposit. The Rays are narrow, inconspicuous, semi-transparent flakes. The Rings are occasionally indicated by a fine, dark or hoary line.

*Tangential Section* as the Radial, but the Rays need the lens, being minute. They show the red resin or gum cells and are about  $\frac{1}{4}$  m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 77/2733.

## 78.—NOT IDENTIFIED.

*Native Name*, "SIBBIDANNI" (2).

*Salient Features*.—A hard, heavy wood of uniform brownish-yellow colour.

*Physical Characters*.—Weight (so far recorded), 61½ lbs. per cubic ft. Hardness, Grade 3, very hard. Taste or smell 0.

*Colour of Heartwood* as above, resembling Boxwood and Barataballi No. 8; scarcely defined from the Sapwood; surface bright; darkens but little on exposure to the air. Sapwood rather lighter in colour; width about 2 ins.

*Bark*.—About  $\frac{3}{8}$  in. thick, light brown, wrinkled, having shallow fissures. Of two layers, the inner  $\frac{2}{3}$  rds crumbling; the outer  $\frac{1}{3}$  rd firm. Surface of log beneath bark, smooth or striated.

*Uses, Qualities, etc.*—"Short trees not over 30 ft., and logs squaring not over 9 ins. Is used in house-framing. Plentiful" (2). Hard to saw. Fissile, takes nails badly; planes hard but well; turns hard and badly; polishes indifferently; brittle. Of little, if any, export value. Sometimes confused with Barataballi, No. 8, on account of the similarity of the two woods; also with Siribidanni, No. 82, and Sebadanni, No. 76, from the resemblance of the names.

*Authorities*.—2. Bell, p. 9. 24a. Rodway.

## ANATOMICAL CHARACTERS.

Those of Barataballi, No. 8, with variations as follows:—

*Transverse Section*.—As light, or lighter, than the other sections.

*Radial Section.*—The Pores have numerous clear or ruby beads that glisten.

*Type Specimens.*—Authenticated by Bell, No. 78/2664.

A tree is mentioned in "The Guide to British Guiana" (20a) as a species of *Hevea*, under the names of Sibbi-Sibbi or Hatti.

## 79.—NOT IDENTIFIED.

*Alternative Names.*—"Sikkisikki-danni" (2); "Siki-siki-danna" (12); "Ironwood" (17).

*Salient Features.*—A hard, heavy, dull brown wood, showing much white deposit in the Pores.

*Physical Characters.*—Weight (so far recorded), 72 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood. Taste or smell 0.

*Colour of Heartwood* as above. "Grey" (2); not defined from the Sapwood. (?) a Sapwood tree. Darkens little if at all on exposure to the air; surface clean to bright.

*Bark.*—(?) Surface of log under Bark, grooved or ribbed.

*Uses, Qualities, etc.*—"Trees short and small. Used for piles and house-framing" (2). Very hard to saw. Fissile, takes nails badly; planes moderately easily but very badly; turns hard but indifferently; polishes indifferently. Of doubtful value for export. Sometimes confused with Sibbi-danni, No. 78, on account of the similarity in the names.

*Authorities.*—2. Bell, p. 9. 12. Hawtayne, p. 387. 17. Laslett, p. 453.

## ANATOMICAL CHARACTERS.

*Transverse Section:*—

*Pores.*—Visible with the naked eye, conspicuous on account of their white contents; little variation; oval; unevenly distributed; all single and all filled with white matter.

*Rays.*—Just visible with the lens; uniform; somewhat irregular; much less than the width of a Pore apart, very close and numerous; scarcely avoiding the Pores; golden.

*Rings.*—Apparently defined; boundary (?) a Pore-less zone; contour nearly regular.

*Soft Tissue* of definite arrangement; type of *Pterocarpus* (see Bania, No. 6, and Wamara, No. 92, many close, fine, undulating, irregular, concentric lines, of similar colour to, but thicker than, the Rays.

*Radial Section.*—The Pores are fine, milk-white lines. The Rays are almost imperceptible. The Rings are not indicated.

*Tangential Section* similar in appearance to the Radial (to the naked eye).

*Type Specimens.*—Authenticated by Bell, No. 79/2735.

## 80.—SIMARUBA AMARA. AUBL. (NOT OF HAYNE).

Nat. Ord., SIMARUBÆE.

*Synonyms*, S. GUYANENSIS. RICH. S. OFFICINALIS. D.C. (not of Macfad.) PICRAENA OFFICINALIS. LINDL. QUASSIA SIMARUBA.

LINN., fil. (not of Blanco.)

*Alternative Names*.—"Acajou blanc in Guadeloupe" (28); "Simarupa, Bitter wood, Bitteresche, Bitterash, Mountain Damson, Bitter Damson, Stave wood in Jamaica" (18); "Pao-Pomba, Aruba, Maruba in British Guiana and the Amazonas region, Gall-tree in Barbadoes" (18a). "Not the Marupa or Simaruba of Para" (21).

*Salient Features*.—A milk-white, light wood with a bitter taste.

*Physical Characters*.—Weight (so far recorded), 27-30 lbs. per cubic ft. Hardness, Grade 8, very soft; compare White Pine (P. Strobus). Smell when dry none, when fresh "bad" (2). Taste very bitter, but not intensely so as in Quassia, and not in specimens that have been dried for a long time. Heartwood not defined from Sapwood; probably a Sapwood tree; surface lustrous; darkens little, if at all, on exposure to the air.

*Bark*.—(?)

*Uses, Qualities, etc.*—"Works of construction in Brazil" (21). "Tanning" (28). "50-60 ft. long, squaring 24 ins.; is very useful for inside boarding, and splits for matches" (2). "Splits seriously in seasoning" (17a). Very easy to rend, saw, plane and turn, but it polishes indifferently; takes nails well. Sometimes confused with Quassia (Picraena excelsa. Lindl.) on account of similarity in colour, appearance, taste, structure and local names. In fact it is not easy to define the difference. Any one not familiar with the taste of Quassia must rely upon the Soft Tissue in Transverse Section. In Quassia the milk-white arcs of this tissue are strikingly prominent, but in the present species are rarely apparent.

*Authorities*.—1, Aublett, p. 27. 2, Bell, p. 9. 4a, Boulger, pp. 438, 439, 440. 5, Cat., Col., Fr., p. 29. 12, Hawtayne, p. 386. 12a, Holmes, p. 20. 16a, Kew Guide, p. 41. 17a, Laslett, p. 288. 18, Leman, p. 149. 18a, Lindley. 21, Miers. 26a, Smith, p. 342. 27a, Stone, p. 27. 28, Wiesner, p. 93.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—Much duller and darker than the other sections.

*Pores*.—Visible with the naked eye, very coarse; little variation; shortly oval in shape; evenly distributed; empty; few; subdivided, mostly pairs and even groups of as many as 23 Pores in compact, irregular clusters.

*Rays*.—Just visible with the naked eye, fine; white; uniform; equi-distant, rather less than the width of a Pore apart.

*Rings*.—Sometimes defined; boundary a band of one row of small Pores or large cells loosely collected at wide intervals; not always present; contour, well rounded.

*Soft Tissue* of definite arrangement; type of Quassia (cf. 27a, Pl. II., fig. 18); abundant, in the form of concentric fragments, winging and often linking the Pores; white; rather wider than the Rays; as dense as the ground and imperceptible in a transparent section, though visible with care in the solid; absent throughout large areas.

*Radial Section*.—Lighter in shade than the other sections. The Pores are prominent, brownish, rather coarse and dull lines. The Rays are very fine, inconspicuous, narrow, shining flakes, yet readily visible. Neither the Rings nor the Soft Tissue are indicated.

*Tangential Section* as the Radial, but the Rays are only just visible, being minute lines about  $\frac{5}{8}$  m/m. high, very narrow even for their size.

*Type Specimens*.—Authenticated by Bell, No. 80/2736. Imp. Inst., No. 0296.

### 81.—HYMENÆA, SP.

*Nat. Ord.*, LEGUMINOSÆ. Perhaps HYMENÆA COURBARIL. LINN.

As the wood is persistently reported to be from this tree, we have thought well to give the alternative names, etc.

*Synonyms*, H. AMINIFERA. STOKES. H. RESINIFERA. SALISB. The generic names Courbari and Courbaril are synonymous with Hymenæa.

*Alternative Names*.—"Courbaril, Locust, Jetahy, Jetahy accu or assu, in the N. and Amaz. Prov., Brazil" (21). "Simiri and Kwannarri (representing two different qualities), in British Guiana" (22); "Locust Gum" (4a); "Pois confiture, Gomme animeé, Jatoba, in Barbadoes and Jatai in Brazil" (26); "Leathery-leaved Locust tree, West Indian Locust tree in the W. Indies, Quapinole" (28); "Locustrier, Algarroba, in R. de Janeiro" (7); "Bois Surin Teck in Dutch Guiana" (3a); "Chimidida, in Fr. Guiana" (1); "Zapateri" (21).

*Salient Features*.—A dark brown to orange-red wood, often streaky; apparently fine and close-grained on account of the scarcity of the Pores; rather heavy and hard.

*Physical Characters*.—Weight (so far recorded),  $33\frac{1}{4}$ – $57\frac{1}{2}$  lbs. per cubic ft. (The lower figure is from an unsound sample). Smell 0. Taste faintly sweetish. Hardness, Grade 3, very hard; compare Blackthorn. Surface dull; darkens on exposure to the air. Sapwood yellow or dirty-white, fairly well defined from the Heartwood; width 3-4 ins.

*Bark*.—About  $\frac{1}{4}$  in. thick; dark brown with shallow fissures; as hard as the wood. Of three layers, the inner showing the continuations of the Rays; the middle white, thin, sharply contrasting;



the outer composed of dead scales. Can be detached entire, and is used by the Indians for making canoes. Surface of log beneath Bark, quite smooth.

*Uses, Qualities, etc.*—"Furniture, mill-beds, trenails" (20); "Never attacked by worms or dry rot" (21); "shop counters—readily procurable in logs from 40-50 ft. in length, squaring 12-26 ins." (2). A wood of good appearance, which may be of use as a substitute for inferior Mahogany. It should be worth a trial for paving blocks. Hard to saw; takes nails badly. Fissile; splits easily; planes and turns moderately hard but well.

*Authorities.*—1. Aublett. 2. Bell, p. 9. 3a. Berkhout, p. 6. Cat., Col., Fr., p. 28. 7. DaGama. 10. Devenish, p. 423. 11. Harley, p. 434. 12. Hawtayne, p. 386. 16a. Kew Guide, p. 37. 17a. Laslett, p. 296. 20. McTurk, No. 37. 21. Miers. 23. Noerdlinger, Vol. V., p. 34. 26. Schomburgk. 26a. Smith, pp. 131, 136. 27a. Stone, p. 99. 28. Wiesner, p. 85. Sometimes confused with other species of *Hymenæa* on account of the similarity of some of the vernacular names such as Jutahy, Gitahy. Allemao mentions five kinds of Jutahy—acu, catinga, cica, merim and pororoca. The names Courbaril and Locust are also sources of confusion.

#### ANATOMICAL CHARACTERS.

As those of Purpleheart, No. 74.

*Transverse Section.*—Much darker in shade than the other sections.

*Pores.*—Readily visible; uniform in size within the limits of each season's growth, but increasing as the tree ages. Very evenly distributed; few; single or sub-divided in groups of 2-7 Pores, radial or nested; sometimes filled with yellowish or ruby gum.

*Rays.*—Just visible; uniform; equi-distant; undulating but scarcely avoiding the Pores, the width of a Pore or less apart; yellowish.

*Soft Tissue* of definite arrangement; in concentric lines or bands, often forming complete circles, at others mere fragments; sometimes as narrow as the Rays, at others as broad as the Pore groups which are embedded in them. Type of No. 74, Saka (cf. Stone 27a, Pl. VI., fig. 47; note fig. 56, Pl. VII., is from young wood and lacks the characteristic structure).

*Pith.*—Small, about 1 m/m. in diameter, having four wings or lobes; reddish or yellowish in colour.

*Radial Section.*—Pores dark brown, rather coarse. Rays prominent when moistened; very conspicuous in the Sapwood. Rings not indicated.

*Tangential Section* as the Radial, but the Pores are scarcely so coarse; the Rays are spindle-shaped lines just visible on account of their numbers, appearing something like those of Mahogany.

*Type Specimens.*—Authenticated by Bell, No. 81/2737. Imp. Inst., No. 0066. Noerdlinger's Sections.

## 82.—NOT IDENTIFIED.

*Native Name*, "SIRIBIDANNI" (2).

*Salient Features*.—A hard, heavy, purplish wood; fine-grained and dense; cold to the touch.

*Physical Characters*.—Weight, not recorded. Hardness, Grade 3, very hard. Smell 0. Taste 0.

*Colour of Heartwood* "purplish" (2). Sharply defined from the Sapwood; darkens little, if at all, on exposure to the air. Sapwood yellowish, suggesting Boxwood; width  $3\frac{1}{4}$ -4 ins. The width of the Sapwood is almost the only character, expressible in words, by which this species can be distinguished from Bania and Wamara.

*Bark*.—(?) Surface of log beneath Bark, smooth or striated.

*Uses, Qualities, etc.*—"A furniture wood. Is scarce and not procurable except in small sizes" (2). "Plentiful in some localities—average height about 50 feet, and it will square free of sap 4-6 ins." (20). Rather hard to saw. Fissile, takes nails badly; planes fairly well; turns moderately hard but well; polishes indifferently. If the sample sent is of average quality this wood is much inferior to Bania and Wamara, and of no value for export. Frequently confused with the two last-named woods, Nos. 6 and 92, on account of similarity in colour, structure and appearance generally, and by name with Nos. 76 and 78.

*Authorities*.—2. Bell, p. 9. 12. Hawtayne, p. 386. 20. McTurk, p. 5.

## ANATOMICAL CHARACTERS.

The same as those of Wamara, No. 92, with the following slight differences, which I give for what they are worth.

*Transverse Section*:—

*Pores*.—Readily visible with the naked eye on account of their lighter colour.

*Radial Section*.—The Pores have no shining black contents. The Soft Tissue is visible in certain lights as fine, brown striæ.

*Type Specimen*.—Authenticated by Bell, No. 82/2738.

## 83.—CARYOCAR BUTYROSUM. WILLD.

*Nat. Ord.*, TERNSTROMIACEÆ.

*Synonyms*, PEKEA BUTIROS. AUBL. P. LENTINOS. AUBL.

*Alternative Names*.—"Souari" (2); "Pekea" (1).

*Salient Features*.—A rather hard, heavy, light brownish-grey wood.

*Physical Characters*.—Weight (so far recorded), 59-62½ lbs. per cubic ft. Hardness, Grade 4, hard; compare Yew. Smell or taste little, if any. Solution in water almost colourless.

*Colour of Heartwood*, uniform, hoary, greyish-brown or light brown. "Dirty grey" (2). "Rougeâtre" (1). Darkens but

little on exposure to the air; sharply defined from the Sapwood; surface bright, becoming dull. Sapwood dirty white; width about  $\frac{1}{2}$  in.

*Bark*.—(?) Surface of log beneath Bark, finely ribbed in a tortuous manner.

*Uses, Qualities, etc.*—"Little used—can be easily got to square 24 ins.—very tough and cross-grained" (20). Saws easily; takes nails fairly well; planes very badly though moderately easily; turns moderately easily but indifferently; polishes indifferently. Of little, if any, export value.

*Authorities*.—1. Aublett, p. 594. 2. Bell, p. 9. 4a. Boulger, p. 425. 12. Hawtayne, p. 384. 17. Laslett, p. 450. 20. McTurk, p. 3. 21. Miers.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—Darker than the other sections.

*Pores*.—Visible to the unaided eye when moistened; uniform; not diminishing towards the close of the season's growth; little variation except in the groups. Evenly distributed; single, also radial sub-divided groups of 2-4 Pores, having a tendency to join up to longer strings. Contents often sparkling brightly, giving the section a frosted appearance.

*Rays*.—Visible with the lens, very fine; uniform; regular; less than the width of a Pore apart; hoary, weak threads widely avoiding the Pores.

*Rings* not defined; boundary doubtful, the zones of rather denser wood may indicate the close of the season's growth; contour regular.

*Soft Tissue* in very narrow borders or sheaths to the Pores.

*Pith*.—(?)

*Radial Section*.—Similar in shade to the Tangential Section. The Pores are medium-sized scratches. The Rays are minute, inconspicuous, semi-transparent flakes. The rings are not indicated. The Soft Tissue sometimes appears as sufficiently prominent borders to the Pores to give the section a hoary appearance.

*Tangential Section* as the Radial, but the Rays need the lens, being minute and about 1 m/m. high, and consist of unusually large cells.

*Type Specimens*.—Authenticated by Bell, No. 83/2739. Imp. Inst., No. 0104.

#### 84.—HYERONIMA ALCHORNEOIDES. ALLEM.

*Nat. Ord.*, EUPHORBIACEÆ.

*Alternative Names*.—"Suradanni" (2); "Dalina" (9); "Urucururana" (0).

*Salient Features*.—A rather hard, heavy, Mahogany-like wood.

*Physical Characters*.—Weight (so far recorded), 45-47 lbs. per cubic ft. Hardness, Grade 6, firm; compare Oak, Teak. Smell or taste 0.

*Colour* of Heartwood reddish brown to nut-brown. "Deep

red" (20); well, but not sharply defined from the Sapwood; surface dull. Sapwood brown, width about 2 ins.

*Bark*.—About  $\frac{1}{4}$  in. thick, reddish brown, corky, fissured; scaling in thin flakes; dark brown, fibrous, crumbling within and full of lighter coloured, harder needle-like bodies. Surface of log beneath bark, smooth or striated.

*Uses, Qualities, etc.*—"Is used for planking punt-bottoms, and should do for sleepers. Is readily procurable in logs up to 35 ft. in length, squaring from 12-14 ins." (2). "Plentiful—grows to a large size" (20). Difficult to split; saws easily; takes nails fairly well; planes and turns moderately hard but badly; polishes indifferently. Of little export value, though of fairly good colour and appearance, and should be useful for many purposes. It is used for spokes in Brazil. Specimen was somewhat unsound but free from grit. Sometimes confused with Carapa, Nos. 14 and 15, on account of similarity in colour, and appearance generally, and with Urucu by name.

*Authorities*.—0. Allemao, p. 31. 2. Bell, p. 9. 9. Dalton, p. 214. 12. Hawtayne, p. 386. 17. Laslett, p. 453. 20. McTurk, p. 5. 27a. Stone, XX. (not described). Allemao says that this species is much different to the Urucurana of Southern Brazil.

#### ANATOMICAL CHARACTERS.

Similar to those of Carapa (cf. No. 14, Frontispiece).

*Transverse Section*.—Rather darker than the other sections.

*Pores*.—Readily visible to the unaided eye as pin holes, diminishing considerably towards the close of the season's growth, great variation in regular order; unevenly distributed, being crowded in some zones and rare in others. They have the appearance of being inverted in order, i.e., the small Pores in the inner or earlier portion of the ring, and the larger in the outer part.

*Rays*.—Visible with the lens, very fine; slightly avoiding the Pores; hoary in colour.

*Rings*.—Apparently well defined; boundary a zone of wood poor in Pores contrasted with the adjoining zone where they are abundant; contour regular.

*Soft Tissue* narrowly sheathing or encircling the Pores.

*Pith*.—(?)

*Radial Section*.—Very plain. Rays almost imperceptible on account of lack of contrast, prominent in the Sapwood or when moistened. Pores coarse; clearly-cut grooves giving the section a very grainy appearance.

*Tangential Section*.—Unlike the Radial as the alternate zones of Pores and Pore-less wood cause a banded appearance. The direction of the Pores is oblique and reversed from time to time.

*Type Specimens*.—Authenticated by Bell, No. 84/2740. Imp. Inst., No. 2642. The latter is, however, of greatly superior quality. Rodway mentions "Suradanni" under the name of *Hieronyma laxiflora*. Muell.

## 85.—NOT IDENTIFIED.

Possibly *Bowdichia virgilioides*, H.B. et K. *Synonym*, B. MAJOR, MART.

*Nat. Ord.*, LEGUMINOSÆ. *Native Name*, "TATABOO" (2).  
"SICOPERA" IN BRAZIL.

No. 85, FRONTISPIECE.

*Salient Features*.—A lustrous, nut-brown or golden-brown, coarse-grained wood, banded alternately light and dark. Structure in Transverse Section clearly visible.

*Physical Characters*.—Weight (so far recorded), 58 lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell 0. Taste little, like Pine.

*Colour* of Heartwood sharply defined from the Sapwood; darkens but little on exposure to the air; surface brilliantly lustrous. Sapwood grey or a dirty oatmeal colour; width,  $\frac{3}{4}$ -1 in.

*Bark*.—About  $\frac{1}{2}$  in. thick, lightly fissured, flaking in patches, very hard and woody; gritty when cut. Surface of log beneath bark scored with spindle-shaped grooves.

*Uses, Qualities, etc.*—"Length up to 50 and 60 ft., squaring 12-24 ins." (2). "Not very common—adapted for mill-bed timbers—boat building, house framing" (20). Saws easily. Fissile, takes nails badly; planes badly. May be useful for furniture as a substitute for Walnut, but it is much coarser in the grain than that wood.

*Authorities*.—2. Bell, p. 9. 12. Hawtayne, p. 384. 17. Laslett, p. 453. 20. McTurk, p. 3.

## ANATOMICAL CHARACTERS.

*Transverse Section*.—Similar in shade to the other sections, patchy in colour.

*Pores*.—Visible with the naked eye, conspicuous, large; not diminishing towards the close of the season's growth; considerable variation both within the groups and elsewhere; evenly distributed, widely scattered; mostly singly, a few pairs and threes; many filled with a white deposit, others with gum.

*Rays*.—Visible with the lens, minute; uniform; fairly regular; about the width of a Pore apart and not avoiding them. Weak, whitish threads.

*Rings*.—Apparently defined; boundary very doubtful; occasionally a fine line may be present.

*Soft Tissue* of definite arrangement; in broad borders or sheaths around the Pores, sometimes extending into wings and sometimes connecting two or more Pores or groups.

*Pith*.—(?)

*Radial Section*.—The Pores are prominent grooves with some much finer; all bordered by hoary Soft Tissue. The Rays are fairly prominent, hoary flakes, and similar in colour to the Soft Tissue.

*Tangential Section* as the Radial, but, if anything, more brilliant, and the Rays need the lens, being minute and about  $\frac{1}{4}$  m/m. high.

*Type Specimens*.—Authenticated by Bell, No. 85/2741; also specimens of *Sicopera* from commercial sources, Nos. 0304, 2635, 2631, 0314.

## 86.—HUMIRIA BALSAMIFERA. JAUME.

Nat. Ord., HUMIRIACEÆ.

*Synonym*, *H. AMPLEXICAULIS*. MART. HUMIRIA = HUMIRIUM.

MYRODENDRON AMPLEXICAULE. WILLD.

The following alternative names probably apply to this wood, as well as to *H. floribunda*:—"Couramira, Nieri, Turanira in Brazil" (99); "Towaronero" (23); "Bastard Bully; Umiri" (21), in the Amazonas Region and N. Province, Brazil; "Bois rouge, in Fr. Guiana" (5); "Tourameira" (7); "Tauronira." Not the "Couramari" described by Martin-Lavigne (20c), p. 125.

*Salient Features*.—A hard, heavy, dark, reddish-brown wood, fine-grained and compact.

*Physical Characters*.—Weight (so far recorded),  $48\frac{1}{4}$ - $74\frac{1}{2}$  lbs. per cubic ft. Hardness, Grade 2, extremely hard. Smell or taste 0. Heartwood well defined from the Sapwood; darkens somewhat on exposure to the air; surface lustrous. Sapwood brownish-white; width about 1 inch.

*Bark*.—About  $\frac{1}{4}$  in. thick, brown, lightly fissured; scaling without, fibrous (bristly) within. Surface of log beneath bark, smooth or striated.

*Uses, Qualities, etc.*—"House-frames, wheel-spokes—considered superior to Greenheart. Plentiful in British Guiana, and may be met with in logs 90 ft. long by 20 ins. square, free of Sap" (22). Rather hard to saw. Fissile, takes nails badly; planes and turns moderately hard and badly; polishes easily but indifferently. Better qualities than the sample, work very well. Useful as a substitute for Bullet-wood. A generally useful wood for purposes where strength and hardness are required. Sometimes confused with Balata, No. 12, on account of the similarity in colour and local names; also with Touri, Houmiri (*H. balsamifera*, J. St. H.) and Umara or Umary.

*Authorities*.—2. Bell, p. 10. 4a. Boulger. 5. Cat. Col., Fr., p. 27. 7. DaGama. 12. Hawtayne, p. 385. 17. Laslett, p. 451. 22. McTurk, p. 4. 21. Miers. 27a. Stone, p. 46 (Pl. IV., fig. 28).

### ANATOMICAL CHARACTERS.

*Transverse Section*.—Much darker in shade than the other sections.

*Pores*.—Conspicuous in the solid wood in places on account of their white colour; not much variation except within the groups; uniformly scattered; few; mostly single, but some pairs; increasing in size as the tree ages.

*Rays*.—Difficult to see even with the lens; uniform; equidistant; rather less than the width of a Pore apart; scarcely lighter in colour than the ground; numerous, 8-13 per m/m.

*Rings*.—Clearly defined if indicated by the regularly recurring lines of denser wood, but these sometimes run into one another and fade away.

*Soft Tissue*.—Little or none.

*Pith*.—(?)

*Radial Section*.—Rather lighter in shade than the other sections. The Pores are rather fine and contain red gum or a white deposit. The Rays are just visible as minute red flakes. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute. The Pores bleed crimson gum when freshly exposed, and glisten like tiny mirrors when dry.

*Type Specimens*.—Authenticated by Bell, No. 86/2712. Noerdlinger's Sections under synonym *Myrodendron*.

## 87.—NOT IDENTIFIED (Probably a *Brosimum*).

*Nat. Ord.*, URTICACEÆ.

*Alternative Names*.—"Tibicushi, Bastard Letter-wood" (2); "Tibicusi" (12); (?) "Oeman Letterhout" (1); "False Letter-wood" (20).

*Salient Features*.—A hard, heavy wood of a rich reddish-brown to nut-brown colour, streaked with black lines; hardly cold to the touch.

*Physical Characters*.—Weight (so far recorded), 63-67 lbs. per cubic ft. Berkhout gives the figure of 1'477 for the Sp. Gr., which equals 92'31 lbs., but this seems to me to be impossible. The Sapwood, when dry, will float in water. Hardness, Grade 2, extremely hard; compare Boxwood. Smell 0. Taste astringent. Heartwood darkens considerably on exposure to the air; surface rather dull. Colour of Sapwood reddish-white; width about 5 ins.

*Bark*.—About  $\frac{1}{4}$  in. thick, light grey or yellow; nearly smooth and nearly white in Transverse Section. Surface of log under bark, smooth or finely striated.

*Uses, Qualities, etc.*—"Similar to those of the true Letter-wood" (2). "Bows" (20). Hard to saw. Fissile, takes nails badly; planes hard and but moderately well; turns hard and well; polishes indifferently. There is evidently but little Heartwood in each tree, still it should find a market amongst the turners and makers of small wooden wares. Usually confused with the True Letterwood, No. 60, on account of the similarity in colour, structure and name.

*Authorities*.—1. Aublett. 2. Bell, p. 10. 3. Berkhout. 12. Hawtayne, p. 387. 20. McTurk.

## ANATOMICAL CHARACTERS.

Practically identical with those of the true Letterwood, No. 60, with the trifling differences below, which are given for what they are worth. The woods are, however, easily distinguishable by those who have an acquaintance with either.

*Transverse Section*.—(cf. Stone 27a., Pl. XIII., fig. 112.) Nearly as light in shade as the other sections.

*Radial Section*.—The Pores are rather reddish in the Sapwood.

*Type Specimens*.—Authenticated by Bell, No. 87/2743. The leaves which accompany the specimen are like Brosimum.

88.—*CENOCARPUS BACABA*. MART.

*Nat. Ord.*, PALMÆ.

*Alternative Names*.—"Tooroo-palm" (2); "Koemboe, Bacaba" (3a).

*Salient Features*.—Not a wood in the ordinary acceptation of the word. A transverse section of the trunk shows a wide ring of hard tissue containing a mass of hard, black strands, surrounding a central core of soft and stringy tissue. Hardness of the outer wood, Grade 2, extremely hard; compare Boxwood.

*Bark*.— $\frac{1}{8}$ – $\frac{1}{4}$  in. thick; smooth but broken up by narrow, spindle-shaped fissures into innumerable areas of the same shape and size; flakes off in scales, exposing the brown layer within.

*Uses, Qualities, etc.*—"Is used to make walking-sticks" (2). This is almost the only use that can be suggested for it, as it is excessively fissile, there being no strength in the tissue between the black strands. No tests made. Very hard to work in any way and chiefly suitable for purposes where the trunk can be used whole, or at least in large pieces. The name of this palm might possibly be confused with the Tourou-tourou tree, *Sterculia pruriens*, Aubl.

*Authorities*.—2. Bell, p. 10. 3a. Berkhout, p. 53. It is often referred to by travellers. Specimen, No. 88/2744.

89.—*NECTANDRA* sp.

*Nat. Ord.*, LAURINÆÆ.

*Native Name*, "WAIBAIMA" (2).

No. 89, FRONTISPIECE.

*Salient Features*.—A fine-grained, light-coloured wood with sometimes a suggestion of green.

*Physical Characters*.—Weight (so far recorded), 48½–57 lbs. per cubic ft. Hardness, Grade 6, firm. Smell, none as regards the wood, but that of the bark is spicy when sawn. Taste slightly astringent.

*Colour* of Heartwood, light-brown to sulphur yellow or even green. Apparently a Sapwood tree, or else the Sapwood merges into the Heartwood very gradually. Surface bright to lustrous.



*Bark*.—About  $\frac{3}{8}$  in. thick; brown; of three layers, the innermost stringy; the middle hard and brown, and the outer of readily-detachable scales that fall off, exposing the brown inner layer in bright spots.

*Uses, Qualities, etc.*—"Superior to Greenheart" (21). Firm; saws somewhat hard. Fissile, takes nails badly; planes easily but badly, being cross-grained in parts; turns moderately easily and well; polishes well.

*Authorities*.—4a. Boulger, p. 425. 21. McTurk.

#### ANATOMICAL CHARACTERS.

The same as those of Yellow Cirouaballi, No. 18, and No. 89, Frontispiece, but the Pores in Transverse Section, though visible to the unaided eye, are not very clear, and are mostly single.

*Type Specimens*.—Authenticated by Bell, No. 89/2745. No. 0231, described in 27a., p. 181, though a Nectandra, is a different wood to the present species.

#### 90.—LECYTHIS sp., near L. LACUNOSA. MIERS.

(It is not *L. grandiflora* as often reported.)

*Nat. Ord.*, MYRTACEÆ.

*Alternative Names*.—"Wadaduri" (20); "Cuyas de Macaco" (A. R. Wallace, "Travels on the Amazon," p. 34); "Canari-Macaca, Pao Macaco" (21); "Sapucaia, Marmites de Singe in Brazil" (90). Some of these names appear to be applied to more than one species of *Lecythis*.

*Salient Features*.—A dense, smooth, hard, heavy wood, of an uniform light or orange-red colour; cold to the touch, but less so than Kakeralli, No. 45.

*Physical Characters*.—Weight (so far recorded), 53½-74 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood or Greenheart. Taste or smell faint, if any. Heartwood clearly defined from Sapwood; surface lustrous; darkens somewhat on exposure to the air. Sapwood, lighter and whiter; width about  $\frac{1}{2}$  in.

*Bark*.— $\frac{1}{8}$ - $\frac{5}{8}$  in. thick; very rough and rugged; deeply fissured vertically; scaling in thick, tough, laminated flakes, which may be separated into bast-like strips. The laminae are clearly marked off in section (lens). Inner layer soft and bast-like. Surface of log beneath bark finely striated.

*Uses, Qualities, etc.*—"Turnery, furniture and barrel staves" (20). Polishes almost naturally as it leaves the tool. The shavings are sticky when compressed in the hand and retain the form of the palm; planes badly and hard; hard to saw. Fissile, takes nails badly; turns hard but well. Very strong; transverse resistance great; it should find a market on this account for spokes and like articles. "May be met with in logs up to 28 sq. ins., free of Sapwood. The tree sometimes attains a height of 100 ft." (20).

*Authorities*.—2. Bell, p. 10. 12. Hawtayne, p. 385. 17. Laslett, p. 451. 7. DaGama. 20. McTurk, No. 22. 21. Miers. 27a. Stone, p. 136.

#### ANATOMICAL CHARACTERS.

Identical with those of Kakeralli, No. 45, cf. Stone (27a), p. 136. Pl. IX., fig. 73. The Pores are perhaps a little larger. The Soft Tissue is thicker than the Rays.

*Type Specimens*.—Authenticated by Bell, No. 90/2746. Imp. Inst., No. 0186.

#### 91a.—\* EPERUA FALCATA. AUBL.

(The E. Falcata of Blanco = *Afzelia rhomboidea* of Vidal, and not the present species.)

*Nat. Ord.*, LEGUMINOSÆ.

*Synonyms*, PANZERA FALCATA. WILLD. EPERUA RUBIGINOSA.

MIQ.

*Alternative Names*.—Wallaba (2); "Pois sabre" (20); "Jebaru-rana, Vouapa tabaca, Bainha de Espada, in Guiana" (21), "and the Amazonas region" (21); "Parive, Eperu, in French Guiana, also Wapa huileux" (1); "Wapa Patouve, in Brazil" (7); "Wouapa, Woapa, Bijlhout, Bylhout, in Dutch Guiana" (3); "Bimiti Wallaba" (?) (12); "Itoori Wallaba" (2). Compare notes at the end of No. 91.

*Salient Features*.—A striking, purplish-red wood, which bleeds crimson gum exceedingly freely; surface very sticky, readily collecting the dust and becoming unpleasant to see or touch.

*Physical Characters*.—Weight (so far recorded), 62 lbs. per cubic ft. Hardness, Grade 3; very hard. Smell and taste like creosote.

*Colour of Heartwood* sharply defined from the dirty-white Sapwood; darkens somewhat upon exposure to the air; surface dull. Width of Sapwood,  $1\frac{1}{2}$ -2 ins.

*Bark*.— $\frac{3}{8}$ - $\frac{1}{2}$  in. thick; smooth; not fissured, but apparently shelling off in thin plates; colour grey to black. "Bitter, used as an emetic" (21). This is not in agreement with my specimens. Surface of log under bark finely striated.

*Uses, Qualities, etc.*—"Chiefly for shingles, which have been known to last 40 years; stands exposure under all circumstances; may be met with in logs from 30-80 ft. long by 15-20 ins. square, free of Sap" (22). Splits very easily, straight and fairly cleanly; takes nails badly; rather easy to saw; planes moderately hard and well; very troublesome to polish as it smears. It should prove a valuable wood for export on account of its hardness and resistance to decay. If cheap and abundant it would make good paving-blocks. For most purposes its stickiness will be against it. Two specimens were sent under the No. 91, but

\* As specimen No. 91a is the better known and typical wood we have placed it before No. 91 (see next page).

only one is referred to in Mr. Bell's report (2). As there are certain marked differences between them, I think that they may be more than mere varieties.

*Authorities.*—2. Bell, p. 10. 3. Berkhout, pp. 25, 29. 5. Cat., Col., Fr., p. 29. 7. DaGama. 12. Hawtayne, p. 384. 17. Laslett, p. 451. 16a. Kew Guide, pp. 36, 38. 20c. Martin-Lavigne, schedule 1, appendix. 21. Miers. 22. McTurk, p. 180. 23. Noerdlinger. 27a. Stone, Pl. VI., Fig. 48.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—Darker in shade than the other sections.

*Pores.*—Readily visible with the naked eye; conspicuous, though of moderate size; variable; evenly distributed except when collected into one-rowed arcs or rings of small Pores; few; single or in radial, sub-divided groups; appearing light red in the solid wood; occasionally full of crimson or amber gum which bleeds copiously.

*Rays.*—Clearly visible with the naked eye; uniform; equidistant; less than the width of a large Pore apart; gently undulating but not avoiding even the larger Pores; numerous, 7-8 per m/m.; cells of exceptional coarseness.

*Rings.*—Clear; boundary, a single row of small Pores with soft tissue between them; contour regular.

*Soft Tissue.*—In zones in the rings; width equal to that of the Rays; also narrowly encircling the Pores, and in isolated, irregular patches.

*Pith.*—(?)

*Radial Section.*—The Pores are conspicuous grooves, having chambers as long as 5 m/m., which may be seen with the naked eye. The Rays are prominent purple flakes, a little deeper in colour than the ground.

*Tangential Section* as the Radial, but not quite so light in colour, and having more red streaks. The Rays are minute, faint, brown lines about  $\frac{1}{8}$  in. high, or more.

*Type Specimens.*—Authenticated by Bell, No. 91a/2755. Berkhout, No. 2638. Imp. Inst., No. 0578. Also Noerdlinger's Section.

#### 91.—

This may possibly be the same wood, but many circumstances point to a variety at least.

*Salient Features* as 91a, but the stickiness is less and the amount of dust collected is hardly enough to obscure the structure in *Transverse Section*.

*Bark.*—About  $\frac{1}{8}$  in. thick; smooth, hard, woody; of one layer plus the epidermis. The Rays are continued into the Bark. Exterior of the log beneath Bark, finely striated.

## ANATOMICAL CHARACTERS.

As those of the preceding species, No. 91a.

*Transverse Section*.—

*Pores*.—Just visible with the naked eye, rather small; little variation except in the pairs which are few; evenly distributed; Pore-rings rare; many with white contents; bleed but very little in this section.

*Rays*.—Visible with the lens, very fine; uniform; regular; about the width of a Pore apart.

*Rings*.—Well-defined; boundary a fine line of Soft Tissue.

*Radial Section*.—Surface lustrous. The Pores are mere scratches, the chambers of which are not visible without a lens. The Rays are readily visible, semi-transparent flakes, but not prominent, and in Tangential Section are scarcely 1 m/m. high.

*Type Specimen*.—Authenticated by Bell, No. 91/2747. There are two kinds of leaves in the collection, one green and the other copper-coloured.

For convenience No. 91a may be called the *thick-barked* Wallaba, and No. 91 the *thin-barked* Wallaba. McTurk (20b), p. 180, states that there are four varieties, of which Sarabebe, No. 77, may be ignored, as it is quite unlike the two now in question. A second is neither mentioned by name nor described, so there remain Bimiti Wallaba and Itoori Wallaba. He refers all four to *Eperua falcata* (E. Jenmani. Oliv.). In another place (20b) he says that Itoori W. is *E. Jenmani*. Oliv.; Bimiti W., a tree with white flowers, is *E. Schomburgkii*, Bth., while Soft Wallaba (which I suspect is our No. 91a) is *E. falcata*. Aubl. Unfortunately we are not in the position to clear the matter up, as the collector, Mr. D. G. A. Spence, in his letter of March 18th, 1907, calls No. 91 "Bimiti Itoori," and appears to be unaware that two kinds of wood were sent for this number. Martin-Lavigne's specimen is our No. 91a.

## 92.—SWARTZIA TOMENTOSA, D.C.

*Nat. Ord.*, LEGUMINOSÆ.

*Synonyms*, *ROBINIA PANACOCO*. AUBL. *R. TOMENTOSA*. WILLD.

FRONTISPIECE, No. 92.

*Alternative Names*.—"Wamara" (2); Brown Ebony, Clubwood" (9); "Pao de remo in Para, Ironwood in Cayenne" (21); not the "Ironwood" described by Martin-Lavigne (20c), p. 153. "Palo Santo" (18a); "Pferdefleisch holz" (28); "Naranjillo" (21); "Bois de Fer, Anacoco" (1); "Saint Martin in Fr. Guiana" (4a); "Hukuya, Anacoco Wanabala in Brazil" (7).

*Salient Features*.—A very hard, heavy, deep purplish wood.

*Physical Characters*.—Weight (so far recorded), 64½-66 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood or Greenheart. Smell 0. Taste faintly astringent.

*Colour* of Heartwood as above. "Reddish brown becoming blackish" (2). Darkens but little on exposure to the air; very sharply defined from the Sapwood; surface bright. Sapwood, oatmeal colour; width from 2-4½ ins.

*Bark*.—About  $\frac{1}{16}$  in. thick; smooth; brown; fibrous; bast-like within. Surface of log beneath Bark, smooth.

*Uses, Qualities, etc.*—"Considered incorruptible; makes excellent oars for boats" (21). Hard to saw; takes nails badly, being too hard; planes moderately hard and badly; turns moderately hard but well; polishes indifferently. (I have had samples which, on the contrary, polished extremely well.) A valuable and beautiful wood, which will find a ready sale for turnery, Tunbridge ware, inlaying, etc. Sometimes confused with Bania, No. 6, and Siribidanni, No. 82, on account of the great similarity in colour and other physical characters.

*Authorities*.—1. Aublett, p. 770. 2. Bell, p. 10. 9. Dalton, p. 214. 16a. Kew Guide, p. 38. 17. Laslett, p. 453. 18a. Lindley, p. 1112. 21. Miers. 28. Wiesner, p. 879. 7. DaGama, p. 88.

#### ANATOMICAL CHARACTERS.

*Transverse Section*.—Nearly black.

*Pores*.—Visible with the unaided eye on account of their light colour; not diminishing in size towards the close of the season's growth; little variation except in the groups; mostly single, some sub-divided groups of 2-4 Pores (or perhaps even 7). Evenly distributed; scattered; contents white; few in number.

*Rays*.—Visible with the lens, very fine indeed; uniform; regular; rather less than the width of a Pore apart, undulating and slightly avoiding the Pores.

*Rings*.—Not defined; boundary doubtful, though the Poreless zones may be some indication; contour regular.

*Soft Tissue* of definite arrangement; type of *Pterocarpus* and of Bania, No. 6. Very numerous, continuous, concentric lines partly embedding and connecting the Pores; width about half that of a Pore.

*Pith*.—(?)

*Radial Section*.—The Pores are very fine scratches, visible in certain lights by means of their shining contents. The Rays are minute flakes on the limit of vision. The Soft Tissue is not visible except with the aid of the lens.

*Tangential Section* as the Radial, but to keen sight the surface (especially of the Sapwood) appears striated in two directions at right angles. This is due to the Soft Tissue which runs vertically, and to the horizontal ("stockwerkartige") arrangement of the Rays, as in Mahogany. They are minute and about 1 m/m. high, and would scarcely make any impression if arranged in échelon.

*Type Specimens*.—Authenticated by Bell, No. 92/2748. Imp. Inst., No. 0297.

## 93.—NOT IDENTIFIED.

*Native Name*, "WARANANA" (2).

*Salient Features*.—"A yellow, close-grained, heavy hardwood" (2).

*Physical Characters*.—Weight (so far recorded), 57½ lbs. per cubic ft. Hardness, Grade 3, very hard. Smell or taste little, if any.

*Colour* of Heartwood as above, sometimes a slight greenish tinge; surface bright; darkens little, if at all, on exposure to the air. Perhaps a Sapwood tree.

*Bark* (?).—Surface of log beneath bark, finely striated.

*Uses, Qualities, etc.*—"Used by Indians for house framing—small sizes but tall" (2). Fissile, takes nails badly; planes and turns moderately easily but badly; polishes badly. The wood resembles an inferior quality of Greenheart, but its export value will depend solely upon its reputation, concerning which there is little on record. Sometimes confused with Warananaballi, No. 94, on account of the similarity of the names.

*Authority*.—2. Bell, p. 10.

## ANATOMICAL CHARACTERS.

Similar to those of some Nectandras, compare Greenheart, No. 29 (cf. Stone 27a., Pl. XI., fig. 99), from which it differs as follows:—

*Transverse Section*.—Similar in shade to the other sections.

*Pores*.—Readily visible with the naked eye; conspicuous; white.

*Rays*.—Also readily visible; the width of a Pore or more apart.

*Rings*.—Sometimes defined; boundary (?) a denser zone of wood; contour regular.

*Tangential Section*.—The Pores are very inconspicuous. The Rays are semi-transparent flakes, visible by reflection.

*Type Specimens*.—Authenticated by Bell, No. 93/2749.

## 94.—GRIAS SP. (not G. Aublettiana).

*Nat. Ord.*, MYRTACEÆ.

*Native Name*, "WARANANABALLI" (2).

*Salient Features*.—A light, soft wood of an uniform reddish to dirty brown colour.

*Physical Characters*.—Weight (so far recorded), 44 lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell 0. Taste, cedar-like; very faint. Heartwood not defined from Sapwood which merges into it; the latter is rather lighter and redder. Surface lustrous.

*Bark*.—About ½ in. thick; smooth and skinny outside; bright red and fibrous inside. Surface of log beneath bark, finely striated.

*Uses, Qualities, etc.*—Saws easily; planes and turns easily but badly; polishes badly. It is possible to confuse this wood with Carapa, No. 15, and Suradanni, No. 84, on account of the similarity in colour.

Of no value for export, but a good wood that should be serviceable in the Colony.

*Authority.*—2. Bell, p. 10.

#### ANATOMICAL CHARACTERS.

##### *Transverse Section.*

*Pores.*—Just visible with the naked eye as pin-holes; not diminishing towards the close of the season's growth; some variation in no particular order; mostly single; many pairs and some groups of 3-4 Pores, the septa between which run in all directions. Evenly distributed, a strong tendency to form oblique lines.

*Rays.*—Visible with the lens; red; extremely close and numerous; uniform; irregular; much less than the width of a Pore apart; serpentine, widely avoiding the Pores.

*Rings.*—Not defined; boundary doubtful.

*Soft Tissue* (if any) of no definite arrangement.

*Pith.*—(?)

*Radial Section.*—The Pores are numerous, occupying one-quarter of the surface; empty. The Rays are inconspicuous, reddish flakes. The Rings are not indicated.

*Tangential Section* as the Radial, but more lustrous, and the Rays need the lens, being minute. Under the microscope (after moistening) they appear to be filled with ruby gum; height, 1-2 m/m.

*Type Specimen.*—Authenticated by Bell, No. 94/2750.

#### 95.—TABEBUIA SP.

*Nat. Ord.*, BIGNONIACEÆ.

*Alternative Names.*—"Warikuri" (2); "Waracoori or White Cedar" (20).

*Salient Features.*—A light, soft, lustrous wood of an uniform pinkish colour.

*Physical Characters.*—Weight (so far recorded), 58½ lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine. Smell or taste 0.

*Colour.*—"Dark brown with a white Sap" (20), according to McTurk, who adds that there are two kinds, one darker than the other. My specimen is pinkish to light brown, and may be "the other" referred to. It is probably a Sapwood tree, as my sample, which would square 10 ins., is all of one colour. Surface beautifully lustrous.

*Bark.*—About  $\frac{3}{16}$  in. thick, brown, soft and corky; flaking in thin scales; of two layers, the outer the crumbling scales, and the

inner of some 20 fine, easily separable, stiff, papery sheets. Outside of log beneath Bark smooth.

*Uses, Qualities, etc.*—"Very durable, especially underground, but splits on exposure to the sun—probably the best wood procurable in the Colony for foundations" (20). "Readily procurable in logs up to 40 ft., squaring 12 ins." (2). Saws easily. Fissile, but takes nails well; planes well and easily; turns moderately hard and indifferently; takes a medium polish. Not an ornamental wood, but should be valuable on account of the ease with which it can be worked, and its durability underground. Sometimes confused with Kretty, No. 50, on account of the similarity in colour and lustre.

*Authorities.*—2. Bell, p. 10. 12. Hawtayne, p. 385. 20. McTurk, p. 6. 24a. Rodway.

#### ANATOMICAL CHARACTERS.

*Transverse Section.*—A little darker in shade than the other sections.

*Pores.*—Visible with the naked eye; uniform; not diminishing towards the close of the season's growth, little variation except within the groups; mostly single, a few pairs; evenly distributed.

*Rays.*—Visible with the lens, very fine; uniform; irregular, at least the width of a Pore apart; slightly avoiding the Pores.

*Rings.*—Well defined, but only to the lens; boundary a fine line of Soft Tissue, not much broader than the Rays; contour regular; average 5 per in. of radius, in my specimens.

*Soft Tissue* of definite arrangement; type of Purpleheart, No. 74, but on a minute scale; surrounding the Pores and joining them up by narrow lines, much broken, not often continuous but numerous and concentric.

*Pith.*—(?)

*Radial Section.*—The Pores are numerous, fine reddish scratches. The Rays are minute, readily visible flakes, yet showing up against the lustrous ground. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute and about 1 m/m. high.

*Type Specimens.*—Authenticated by Bell, No. 95/2751.

#### 96.—NOT IDENTIFIED.

*Native Name,* "WYABALLI" (2).

*Salient Features.*—A hard, heavy, cold, close-grained, compact, greenish-white wood.

*Physical Characters.*—Weight (so far recorded), 49 lbs. per cubic ft. Hardness, Grade 2, extremely hard; compare Boxwood, Smell or taste 0. Heartwood, "Greenish" (2) to yellow, darkens but little on exposure to the air; surface dull to bright; ill-defined from the Sapwood, which appears to be about 1 in. wide.



*Bark.*— $\frac{1}{8}$ – $\frac{1}{4}$  in. thick, brown, sloughing off in small, rounded scales full of hard, white bodies; appears grey in section; fibrous within. Surface of log beneath Bark finely ribbed.

*Uses, Qualities, etc.*—"House building—not readily procurable" (2). Saws hard. Fissile, takes nails badly; planes and turns moderately hard and badly; polishes indifferently. Not an ornamental wood; of doubtful value for export.

*Authority.*—2. Bell, p. 10.

#### ANATOMICAL CHARACTERS.

The same as those of Greenheart, No. 29, with the following differences:—

*Transverse Section.*—Nearly similar in shade to the other sections.

*Pores.*—Evenly distributed in the narrow rings, but in the broad ones they form straggling oblique lines.

*Rays.*—Much less than the width of a Pore apart, avoiding and running round them.

*Rings.*—Apparently defined; boundary (?) a change in the arrangement of the Pores from point to point.

*Soft Tissue* of definite arrangement, consisting of sheaths or short wings to the Pores, the latter, when present, of a length less than the width of a Pore.

*Radial Section.*—The Pores are fine, yet readily visible lines, many containing glistening beads.

*Type Specimens.*—Authenticated by Bell, No. 96/2752.

#### 97.—NOT IDENTIFIED.

*Native Name,* "YAWARRIDANNI" (2).

*Salient Features.*—A light, soft, lustrous, brownish-white wood.

*Physical Characters.*—Weight (so far recorded),  $40\frac{3}{4}$  lbs. per cubic ft. Hardness, Grade 7, soft; compare Pine or cigar-box Cedar. Smell or taste little, if any.

*Colour* of Heartwood as above; fine brown striations here and there; ill-defined from the Sapwood; surface brilliant in Radial Section; darkens but little on exposure to the air. Sapwood, dirty white; width about 2 ins.

*Bark.*—About  $\frac{1}{2}$  in. thick, covered with very small warts; fibrous and dark brown within, containing light coloured, hard, rod-like bodies. Surface of log beneath Bark grooved.

*Uses, Qualities, etc.*—"Furniture—said to be suitable for sawing into sleepers and paving-slabs—readily procurable in logs up to 40 ft. in length, squaring from 12-16 ins." (2). Saws easily (very spongy, condition of test piece bad). Takes nails well; planes easily but very badly; turns moderately easily; polishes indifferently. It would make cigar and tea boxes and similar articles. It has a beautiful lustre, but lacks depth of colour, hence it is scarcely likely to compete as a furniture wood, even with Baywood. Still,

on account of the ease with which it can be worked, it may prove to be a very useful wood in the Colony.

*Authority.*—2. Bell, p. 10.

#### ANATOMICAL CHARACTERS.

Somewhat similar to those of Mexican Cedar. Compare No. 14, Frontispiece.

*Transverse Section.*—Considerably darker than the other sections.

*Pores.*—Visible with the naked eye as holes, large; not diminishing towards the close of the season's growth, the smallest at the inner edge of the Ring; some variation; evenly distributed; few, widely scattered; single or in sub-divided radial groups of 2-4 Pores.

*Rays.*—Visible to good sight; red; fine; uniform; regular, rather less than the width of a Pore apart, lightly avoiding them.

*Rings.*—Occasionally defined; boundary, when present, a narrow zone of denser wood; contour regular.

*Soft Tissue* of no definite arrangement.

*Pith.*—(?)

*Radial Section.*—The Pores are coarse, empty grooves often in pairs. The Rays are small, appearing as a matt shading. The Rings are not indicated.

*Tangential Section* as the Radial, but the Rays need the lens, being minute and about '25 m/m. high.

*Type Specimen.*—Authenticated by Bell, No. 97/2753.

## GRADES OF HARDNESS.

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It is not possible to express in words that which is commonly understood by the term "Hardness," chiefly because there is no measuring instrument which is free from serious deficiencies. We are therefore compelled to rely upon the evidences of our senses. As these vary in different individuals, and as the wood of different trees of the same species, or even parts of the same tree vary within wide limits, it is obvious that a scale can be only approximately correct. The term "hardness" is also a loose one, but the more correct phrase, "resistance to impact," while truly expressing the sense in which the former term is used in this book, is objectionable, inasmuch as it implies an accuracy which is not attainable at the present moment. I have been prevented from carrying out a design for an instrument which will enable me to express the resistance to impact in figures (cf. 27*a.*, p. 283) by the expense. I hope that I shall be able to complete it in the near future.

In default of anything better, I have grouped the woods of this collection in eight grades, adding a number of well-known commercial woods for comparison. The eight grades correspond with those of Noerdlinger, who was the first to make use of this scheme.

*Grade 1.—Excessively hard.*

Hackia, Bullet-tree, Letter-wood.  
Lignum-vitæ, Ebony.

*Grade 2.—Extremely hard.*

Arrewewa, Bania, Boorohada, Dukalaballi, Greenheart, Kakaralli, Kautaballi, Kumara, Marci-balli, Moraballi, Morakokuru, Saka, Sikki-sikki-danni, Tibikushi, Tooroo Palm, Wadaduri, Wamara, Yawaridanni.

Boxwood, Lilac, Jarrah, Karri, Blue Gum.

*Grade 3.—Very hard.*

Barrakarra, Brown and Yellow Cirouaballis, Eura-balli, Hymarakushi, Kabukalli, Mora, Phokadie, Simiri, Wallaba, Waranana.

Whitethorn, Blackthorn, Persimmon.

*Grade 4.—Hard.*

Assapookoo, Barata-balli, Dakama, Hiawao-balli, Hoorihee, Howadanni, Irriariadanni, Itikabouraballi, Kokeeru, Mora-bucquia, Pakoorie, Sebadanni, Sirribidanni.  
Hornbeam, Elder, Yew, Laburnam.

*Grade 5.—Rather hard.*

Kretty, Koorobovilli, Purpleheart, No. 73.  
Ash, Holly, Plum, Common Elm.

*Grade 6.—Firm.*

Aramata, Assakoola, Boobooraballi, Caraba-balli, Determa, Edaballi, Fogle-kop, Hyariballi, Koolishiri, Kurahara, Manniriballi, Suradanni.

Teak, Chestnut, Beech, Walnut, Apple, Oak.

*Grade 7.—Soft.*

Arrisourou, Burada, Caraba (white), Dalli, Duka, Hitchia, Hoobooballi, Hoorowassa, Ineeriballi, Kamarakata, Killikowa, Koolaballi, Lanaballi, Manni-balli, Oolu, Sereebebe, Tataboo, Waranana-balli, Warakuri.

Willow, Pine, Horse Chestnut, Alder, Birch, Hazel, English Cherry, Canary Whitewood.

*Grade 8.—Very soft.*

Dukuria, Kakataraballi, Kōkatara, Phootee, Simarupa.

White Pine (American), Poplar, Lime, Sequoia.

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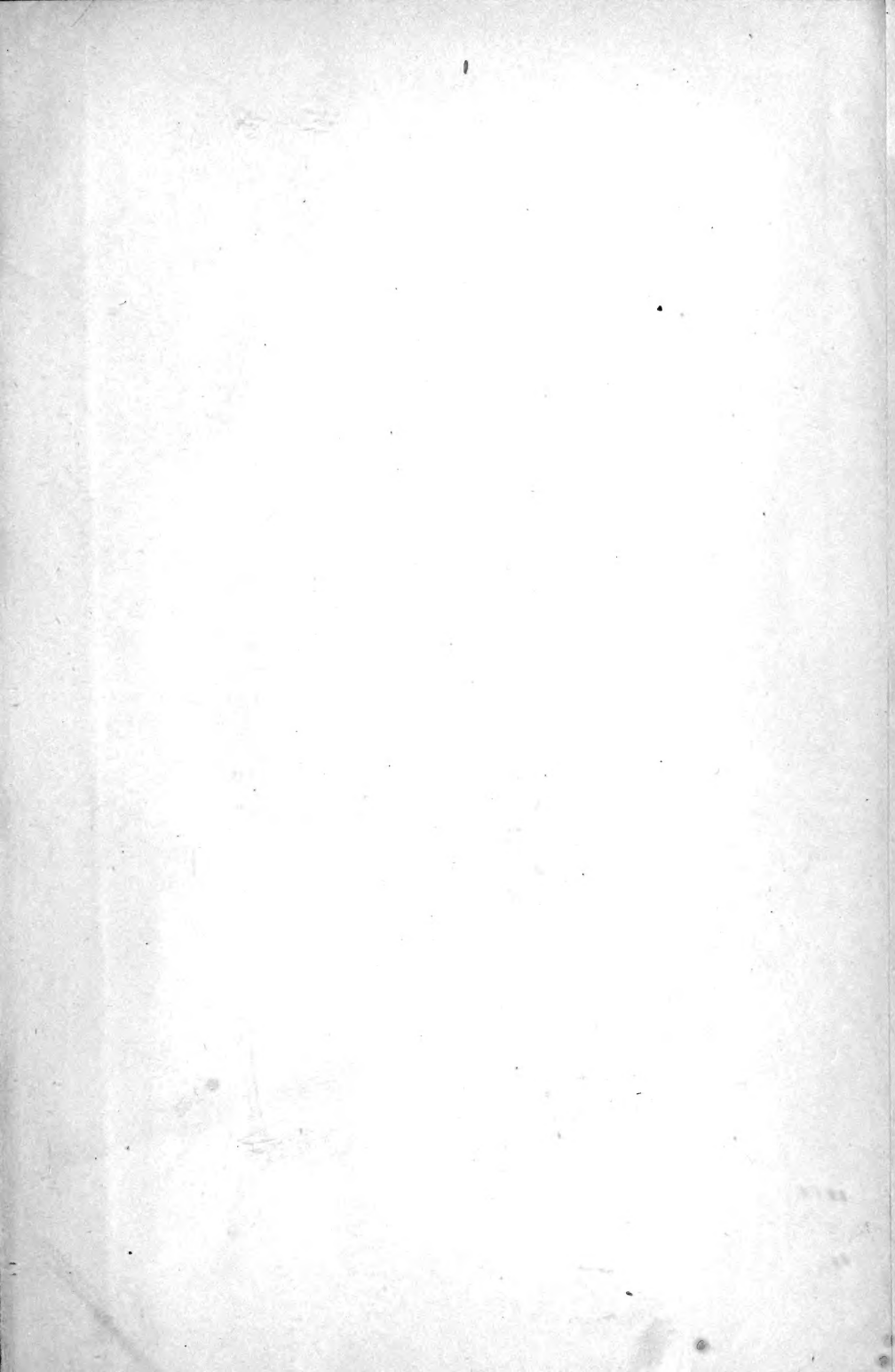
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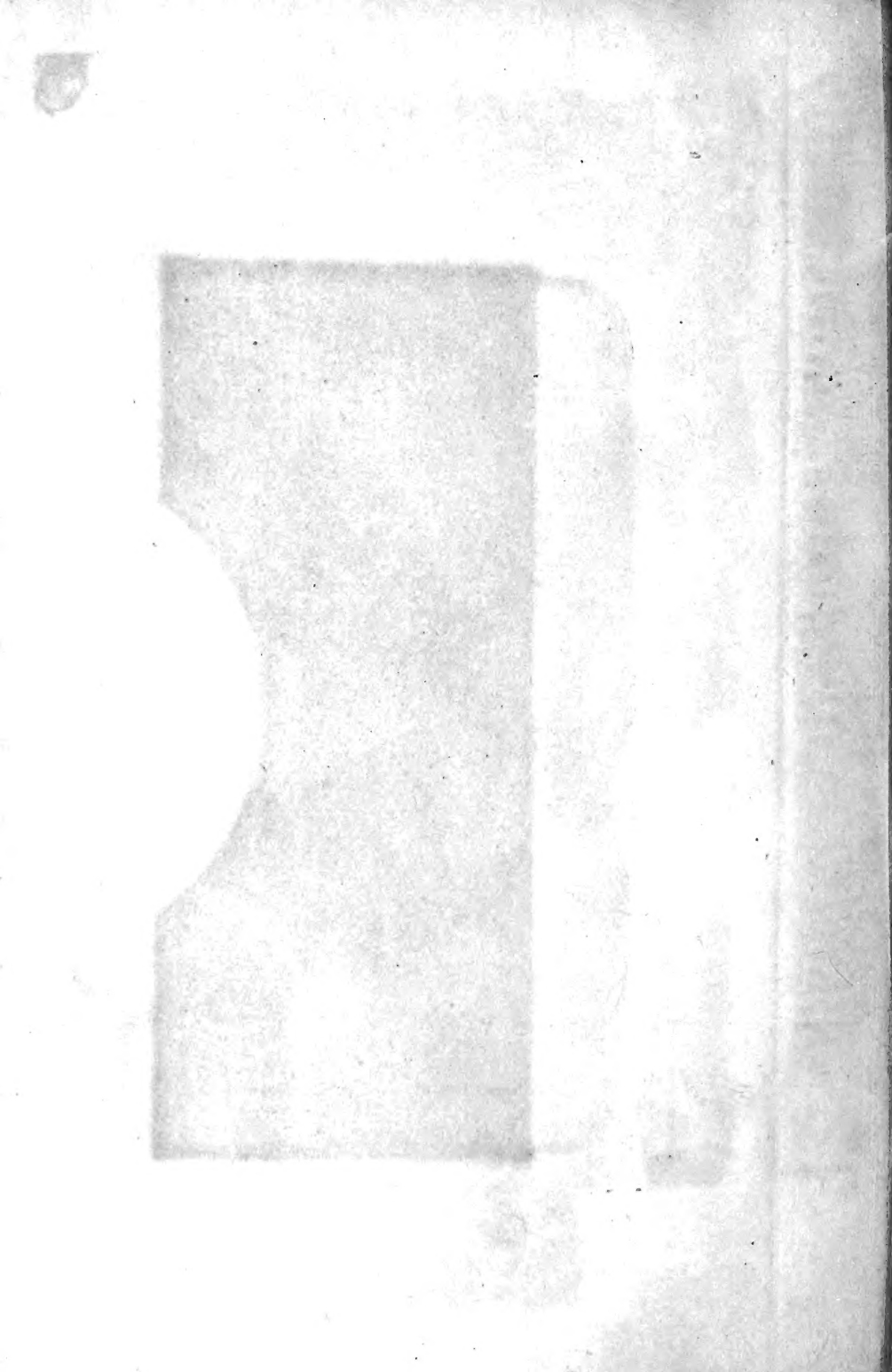
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